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USER'S MANUAL FOR CASSANDRA: CLOUD SNAPSHOTS OF DUST RAISED ALO--ETC(U)  
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TECHNICAL REPORT ARBRL-TR-02116

USER'S MANUAL FOR CASSANDRA: CLOUD  
SNAPSHOTS OF DUST RAISED ALOFT

Richard L. Showers  
Carl Crisco

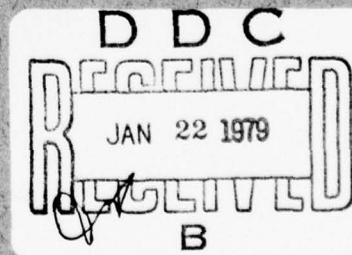
November 1978

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US ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND  
BALLISTIC RESEARCH LABORATORY  
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The computer code, CASSANDRA, has been developed to simulate the spatial distri- bution and concentrations of dust raised aloft by a nuclear cloud. The code utilizes the DELFIC cloud rise description as the basis for a dynamic wafer shape/transport model. Dust concentration for a particular particle size class is calculated directly from the radius of the contributing wafer at the altitude of interest. The outputs of the program are either an array of numbers specifying the values of collective dust density on a gridwork of points in space or a tabulation of		

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2 → dust concentration at specified coordinates and times.

As a test case a simulation of the high explosive test Dial Pack was performed. The computed values were within the range of values reported from the cloud sampling.

In addition to a general description of the code, a user's guide has been incorporated. Examples have been included of computer generated output along with a complete listing of the CASSANDRA code.

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DDC	Ext Section <input type="checkbox"/>
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## I. INTRODUCTION

A nuclear detonation on or close to land creates large persistent clouds of particulate debris, or dust, consisting of dense particles with sizes ranging to thousands of microns. Such a debris cloud poses a threat to RV's reentering the atmosphere at high velocities or ABM's leaving the ground. To determine the threat of erosion of missile heat shields, one must know the spatial distribution and concentrations of the material in the air. The computer code CASSANDRA has been developed as a means of supplying that information.

CASSANDRA is an acronym for "Cloud Snapshots of Dust Raised Aloft". It is a computer program designed to simulate the movement of dust raised aloft by a nuclear cloud. It offers a rapidly executed calculation of dust distribution and concentration for any time after the cloud begins to rise.

The code incorporates the highly detailed rising cloud model of the DELFIC<sup>1</sup> (Defense Land Fallout Interpretive Code) which provides a table of cloud parameters at predetermined time intervals from the time the cloud begins to rise to the time of stabilization. Other than the code necessary to produce the table of cloud parameters, CASSANDRA uses the particle fall procedures and atmosphere model of the DELFIC, but the remainder is a complete departure from that code.

## II. CODE DESCRIPTION

The analytical and geometric basis of CASSANDRA begins with the description of the dust cloud at the initial time, which is the time that it begins to rise-usually several seconds after burst. For the purposes of cloud-rise calculations, the cloud is assumed to be an oblate spheroid. For dust calculations, the cloud is modeled, at the initial time, as a right circular cylinder. This cylinder is loaded with an uniformly distributed soil mass which is assumed to be composed of particles with an assigned size distribution. The soil mass in the cloud is subdivided into, at most, 200 particle size classes of equal mass and each of the particle size classes defines a separate, geometrically identical, colocated, dust cloud. Next, a geometric subdivision

1. *"Department of Defense Land Fallout Prediction System", DASA 1800*
  - a. *Vol I - System Description, 27 Jun 66 (AD 483 897)*
  - b. *Vol II - Initial Conditions, 30 Sep 66 (AD 803 144)*
  - c. *Vol III - Cloud Rise, 19 May 67 (AD 819 770)*  
*Vol III - Cloud Rise, Revised, 1 Sep 70 (AD 879 890)*
  - d. *Vol IV - Atmospheric Transport, 2 Feb 67 (AD 815 263)*
  - e. *Vol V - Particle Activity, Feb 68 (AD 832 239)*
  - f. *Vol VI - Output Processor, 20 Feb 67 (AD 814 055L)*
  - g. *Vol VII - Operator's Manual, Apr 68 (AD 836 871)*

is made of each of the colocated clouds by passing through them a set of equally spaced, parallel, horizontal planes which divide the clouds into a series of smaller subcylinders which are referred to as wafers. The wafers are the basic units of transport of CASSANDRA. Each of the geometrical wafers, then, becomes a set of superimposed wafers, one for each particle size class, and after the initial time each of the wafers is assumed to be transported independently. For the purpose of defining a dynamic wafer shape, each of the wafers is structured at the initial time by an arbitrary number of equally spaced altitude reference planes parallel to the top and bottom. The altitude reference planes subdivide the wafer vertically into compartments which aid in defining an outer shape for the wafer as it falls from the cloud.

Figure 1 represents, in cross section, the cloud at the initial time from a 1 kt detonation. The cloud has been subdivided into three wafers. The lower horizontal line represents the ground and the cloud has these dimensions and altitude at two seconds (initial time). The horizontal dashed lines represent an arbitrary number of internal altitude reference levels assigned to each wafer. These altitude reference levels provide internal reference altitudes at which wafer radii are calculated as different levels fall below the rising cloud bottom. These reference levels allow the wafer to assume a dynamically determined shape derived from the dynamics of the rising, expanding, wind-shifted cloud.

The growth, shape, and transport of wafers can best be visualized by first considering the simpler case of a single dust particle in the cloud at initial time. As the gas cloud rises it will impart an upward velocity to the particle which is equal to the velocity of the cloud itself. At the same time, the particle will have a downward component of velocity due to gravitational settling. The magnitude of the gravitational settling rate will be determined by the size of the particle, its mass and the density of the gas in the cloud at the time of interest. The particle, then, at any time, will have a vertical velocity which is the resultant of its upward and downward components. If the magnitude of the downward component is great enough, the particle will fall below the cloud bottom sometime before stabilization.

The wafers are transported by assuming that the wafer tops and bottoms are independent and that fall rates are determined by assigning the largest particle in the particle size class, characterizing the wafer, to the bottom and the smallest particle to the top. The altitudes of the wafer top and bottom are calculated for the end of a particular time step by calculating rates of fall of the appropriately sized particles within the cloud and subtracting those from the rate of rise of the cloud. If the bottom of the wafer does not fall below the bottom of the cloud during the time step, then new altitudes of the intermediate reference planes are calculated by allowing them to be equally spaced between the new wafer top and bottom altitudes. Additionally, the wafer radius at the top and bottom and at each reference altitude and horizontal coordinates of the wafer top and bottom is

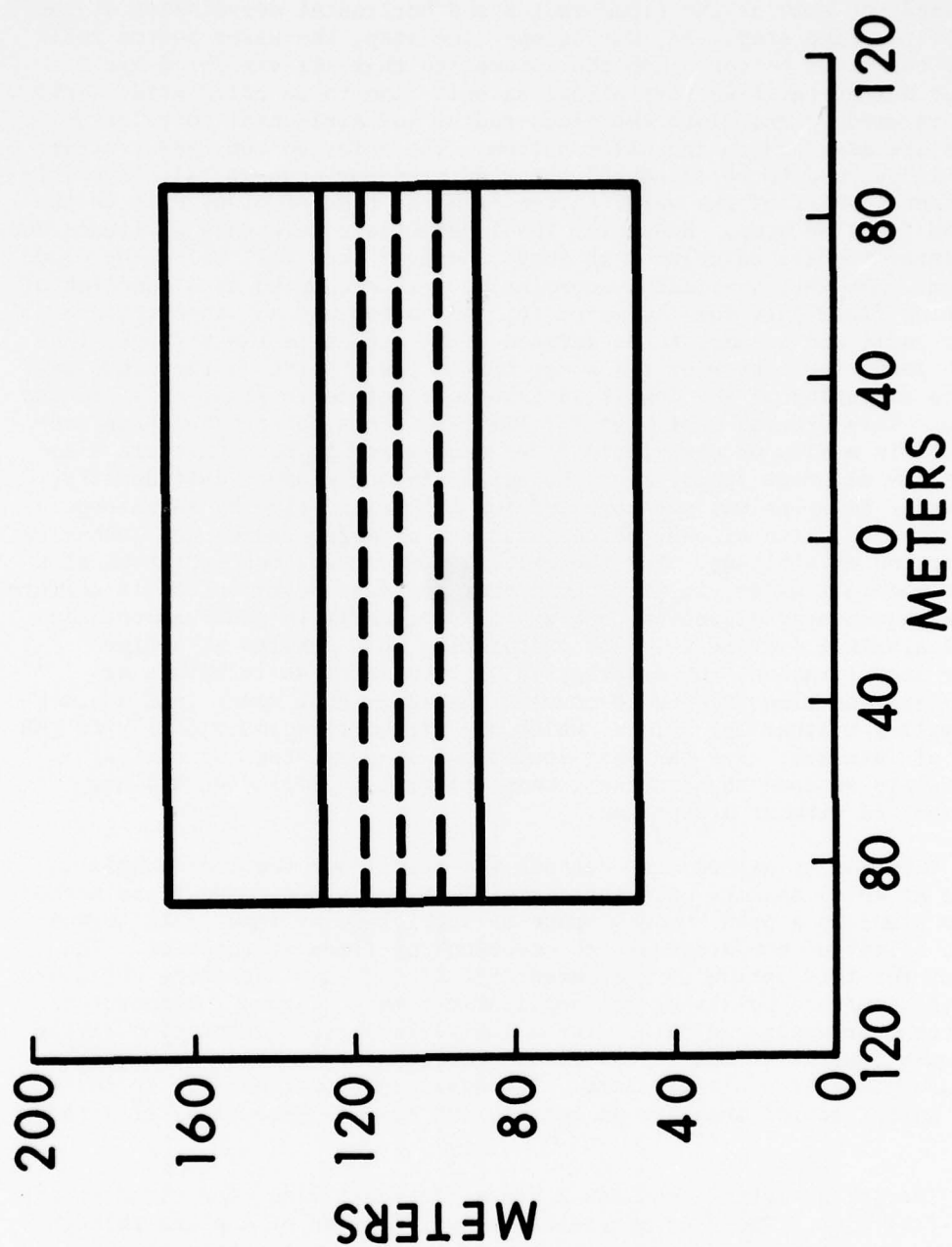


Figure 1. Cross Section of CASSANDRA Cloud 1.0 kt at 2.0 Seconds

38 12 04 184

assigned the same as the cloud radius and horizontal coordinates at the end of the time step. If, during any time step, the wafer bottom falls below the cloud bottom, then the assumption that all variables are linear during the time step allows an exit time to be calculated. This time is used to calculate the cloud radius and horizontal coordinates which are assigned to the wafer bottom. The wafer bottom radius after exit is assumed to be fixed and the wind transport coding calculates the horizontal shift of the wafer bottom from the time of cloud exit to the end of the time step. Radii for the intermediate reference altitudes and the wafer top are calculated as above whenever they fall below the cloud bottom. However, horizontal coordinates are calculated as a function of the wind field only for the wafer top and bottom and any intermediate wafer radii are assumed to be defined with respect to the straight line which joins the center of the wafer bottom and a point on the cloud axis at the elevation of the lowest intermediate reference plane still in the cloud. This process continues for all time steps to stabilization and results in a file of descriptions for each wafer in each particle size class for all time steps. For the actual calculation of dust density, the wafer descriptions are computed for a specific time by an interpolation process which allows the computations of wafer radius and center as a function of altitude. For the calculation of mass concentration at a point within a wafer, it is assumed that the mass distribution is uniform in the horizontal direction, but exists vertically in equal amounts in equal altitude increments. For calculating dust density at a time after stabilization, the description of each wafer as it exists at stabilization time is used to convert the individual wafer into a stack of smaller cylindrical wafers, which are transported individually to the time of interest. For the post-stabilization case, the cylindrical wafers are assumed to have their mass uniformly distributed and are transported without distortion.

The user is allowed two methods for specifying the coordinates in space at which density calculations will be performed. The first method is to simulate a path through space by supplying, as input data to the code, a list of coordinates with accompanying times of interest. The output for this option is a printed list of the mass densities calculated for the separate points at the applicable times. Figure 2 demonstrates the computer-generated output for a low yield surface detonation giving the mass concentrations at the listed coordinates in space with the accompanying times all the same. The mass concentrations are in  $10^{-8}$  g  $\text{cm}^{-3}$  units, coordinates are in metres, and time in seconds after detonation.

The second method provides a cross-sectional view of a cloud at any specified time. The user specifies the orientation of a plane through ground zero, perpendicular to the ground, and the outer boundaries of a rectangle of interest in the plane. Figure 3 illustrates this output option. The detonation was of low yield and a single direction wind field was applied in which the velocity increased gradually with altitude. The time is 350 seconds, which is before stabilization. Contours of equal mass concentrations were drawn directly on the map. Mass concentrations are in units of  $10^{-8}$  g  $\text{cm}^{-3}$ , altitude and downwind range in metres.

TARGET COORDINATES  
VALUES RELATIVE TO GZ

NO.	X	Y	Z	T
1	.0000	.0000	.1000+04	1200.0
2	.0000	.0000	.1500+04	1200.0
3	.0000	.0000	.2000+04	1200.0
4	.0000	.0000	.2500+04	1200.0
5	.0000	.0000	.3000+04	1200.0
10	ISTART	1	ISTOP	100
COMBIN				
PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 209.34 TO 2000.00 MICRONS				
1	.3859+01	2	.0000	4
			.0000	5
PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 197.52 TO 209.34 MICRONS				
1	.1113+02	2	.0000	4
			.0000	5
PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 184.92 TO 197.52 MICRONS				
1	.1723+02	2	.1827+01	4
			.0000	5
PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 171.37 TO 184.92 MICRONS				
1	.4522+02	2	.2337+01	4
			.0000	5

Figure 2. Dust Concentration at Target Coordinates at Specified Times

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS						156.62	TO	171.37	MICRONS
1	.0000	2	.3406+01	3	.0000	4	.0000	5	.0000
PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS						140.29	TO	156.62	MICRONS
1	.0000	2	.6732+01	3	.1040+00	4	.0000	5	.0000
PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS						121.72	TO	140.29	MICRONS
1	.0000	2	.3281+02	3	.1038+01	4	.0000	5	.0000
PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS						99.64	TO	121.72	MICRONS
1	.0000	2	.0000	3	.1246+01	4	.0000	5	.0000
PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS						70.77	TO	99.64	MICRONS
1	.0000	2	.0000	3	.9921+01	4	.5719+00	5	.0000
PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS						.01	TO	70.77	MICRONS
1	.0000	2	.0000	3	.4800+01	4	.1152+01	5	.0000

Figure 2. Dust Concentration at Target Coordinates at Specified Times (Continued)

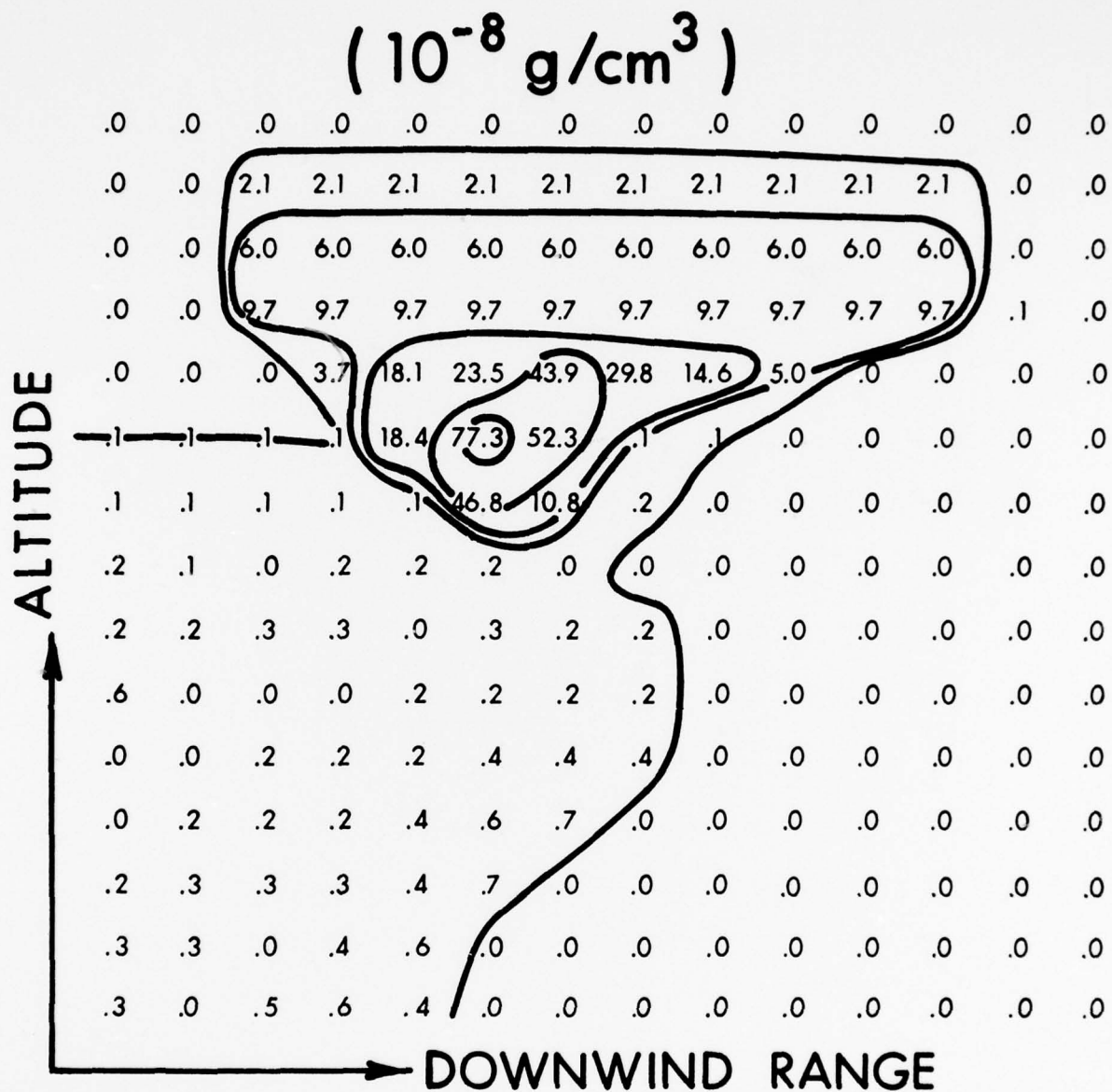


Figure 3. Dust Concentration at 350 Seconds

### III. FORTRAN LISTINGS OF CASSANDRA

3:FOR:5 CASSANDRA.ATMR.R  
FOR S0F3-06/11/76-10:06:43 (1.)

SURROUTINE ATMR ENTRY POINT 000751

STORAGE USED: CODE(1) 000772: DATA(0) 000202: BLAN. COMMON(2) 000000

COMMON BLOCKS:

0003 SET1 002323  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 FROR  
0006 NROUS  
0007 NIO3\$  
0010 NIO2\$  
0011 NIO1\$  
0012 NPRT\$  
0013 XPRR  
0014 FXP  
0015 NERR2\$  
0016 NREWS  
0017 NWRUS  
0020 NRRUS  
0021 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000117	10F	000322	100L	0001	000212	1070L	0001	000321	111L	000342	113L	
0001	000353	115L	000370	120L	0001	000372	130L	0001	000027	134G	000377	135L	
0001	000406	137L	000411	140L	0001	000425	150L	0001	000103	1626	000120	20F	
0001	000455	200L	000523	220L	0001	000537	222L	0001	000605	225L	000627	240L	
0001	000644	250L	000355	2565	0001	000723	270L	0001	000121	30F	000442	3136	
0001	000601	3746	000122	40F	0001	000166	50L	0001	000313	60L	000173	70L	
0001	000223	72L	0001	000256	73L	0001	000033	90L	0004	000000	ALT	000056	AP
0000	R 000046	ATMM4X	0000	R 000026	ATWSUB	0000	R 000036	ATWZRO	0000	R 000404	ATP	000106	A1
0000	R 000107	A2	0000	R 000110	A3	0000	R 000111	A4	0000	R 000112	A5	000113	A6
0000	R 000114	A7	0000	R 000115	AB	0004	001010	B0	0004	000000	CAY	001011	CG
0004	001321	CHANGE	0004	001322	CMLR	0004	001323	C2	0004	00127	C2	001310	C3
0004	001331	C6	0004	000104	DALT	0004	001332	DEK	0004	000001	DETIN	000015	DIAM
0003	000326	MEAN	0004	001333	DNID	0003	000327	DNS	0004	003147	DRM	003150	DS
0004	003151	DST	0004	003152	DST0	0004	003153	DST1	0004	003154	DST2	003155	DT
0004	003156	DJ	0004	003157	DWT	0004	003160	DX	0004	003161	D7	003162	ED
0004	003163	EK	0004	003164	EPS	0004	R 003165	ES	0004	R 003166	ETA	003167	EXPO
0004	003572	F	0003	000331	FWASS	0004	R 000000	FWT	0004	003573	FW	003574	GPV
0003	001170	HFIHT	0004	004200	HLR	0004	R 004201	HOB	0004	I 000072	T	000641	INDISTP
0003	000642	IFXFC	0000	I 000067	IG0	0000	000150	INJPS	0004	I 004202	IRAM	004203	IRAN
0003	I 000643	IRISE	0000	I 000103	IRORR	0003	I 000644	ISIN	0004	I 000645	ISOUT	004204	KCLO
0004	004205	KD1	0004	004206	KRX	0004	I 004207	KS	0004	004210	KSV	004211	MCX
0004	004212	MWYA	0004	004213	N	0000	I 000070	NARNCH	0004	000646	NDSTR	001172	NH000
0004	004214	NNN	0000	I 000105	NPV	0004	I 0004215	NPVA	0000	I 000073	N1	000074	N2



42*	00104	4Y(200)	Z	ZGRF	ZBRSTZ	ZLMT	ATMR 042
43*	000105	DIMENSION FMT(12),SCALE(10),ALNSUB(R),ATMZRO(8),ATMMAX(R),AP(R)					
44*	000165	*****					
45*	000105	*****					
46*	000105	*****					
47*	000106	*****					
48*	000107	*****					
49*	000110	*****					
50*	000111	*****					
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98*	000171	*****					
99*	000171	*****					
100*	000171	*****					

[illegible]



00372	213*	C	ALTITUDE FROM -1000 TO 50000 METERS BY LINEAR INTERPOLATION	ATMR 213	000574
00372	214*	C	FROM THE INPUT TABLES	ATMR 214	000574
00372	215*	C		ATMR 215	000574
00373	216*		DO 250 I=2,256	ATMR 216	000601
00376	217*		ALT(I)=ALT(I-1)+DALI	ATMR 217	000601
00377	218*		IF(A1-GE,ALT(I))GO TO 250	ATMR 218	000605
00401	219*	255	IF(ALT(I)-A1 .LT. 2.) GO TO 250	ATMR 219	000610
00403	220*		NPV=NPV+1	ATMR 220	000615
00404	221*		IF(NPVA-NPV .GE.0)GO TO 240	ATMR 221	000620
00406	222*	250	IPROG=-230	ATMR 222	000624
00407	223*		GO TO 130	ATMR 223	000625
00410	224*	260	READ(IRISE)A1,A2,A3,A4,A5,A6,A7,A8	ATMR 224	000627
00422	225*		GO TO 225	ATMR 225	000642
00423	226*	250	TERP= DALI / (A1-ALT(I-1))	ATMR 226	000644
00424	227*		ATP(I)=ATP(I-1)+TERP*(A2-ATP(I-1))	ATMR 227	000650
00425	228*		RHZ(I)=RHZ(I-1)+TERP*(A3-RHZ(I-1))	ATMR 228	000655
00426	229*		ETA(I)=ETA(I-1)+TERP*(A4-ETA(I-1))	ATMR 229	000662
00427	230*		PRS(I)=PRS(I-1)+TERP*(A5-PRS(I-1))	ATMR 230	000667
00430	231*		GRV(I)=GRV(I-1)+TERP*(A6-GRV(I-1))	ATMR 231	000674
00431	232*		SLM(I)=SLM(I-1)+TERP*(A7-SLM(I-1))	ATMR 232	000701
00432	233*		RLH(I)=RLH(I-1)+TERP*(A8-RLH(I-1))	ATMR 233	000704
00433	234*	260	CONTINUE	ATMR 234	000715
00435	235*		NPVA=256	ATMR 235	000715
00436	236*		NPVNCHE2	ATMR 236	000717
00437	237*		GO TO 111	ATMR 237	000721
00440	238*	270	RETURN	ATMR 238	000725
00441	239*		END	ATMR 239	000771

END OF C. WPT. ATION: NO DIAGNOSTICS.

3:FOR:5 CASCANDRA.R0111.2  
FOR 50E3-06/11/76-11:07:10 (1,1)

# BLOCK DATA

STORAGE USED: CONF(1) 000000; DATA(0) 000000; BLANK COMMON(2) 000000

## COMMON BLOCKS:

0003 CLOUD 006601

## STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0003	000000	ALT	0003	000404	ATP	0003	001010	B0	0003	001011	C6	0003	R	001321	CHANGE
0003	R	001322	CMLR	0003	001323	CX	0003	003127	C2	0003	003130	C3	0003	003131	C6
0003	003132	DFK	0003	003133	DNID	0003	003147	DRM	0003	003150	DS	0003	003151	NST	
0003	R	003152	DST0	0003	R	003153	DST1	0003	R	003154	DST2	0003	003155	DT	
0003	003157	DWT	0003	003160	DX	0003	003161	DZ	0003	003162	EN	0003	003163	FK	
0003	003164	FPS	0003	003165	ES	0003	003166	ETA	0003	003572	F	0003	003573	FW	
0003	003574	GRV	0003	004200	HLR	0003	004201	HOB	0003	004202	IPAM	0003	004203	IRAD	
0003	004204	KCLD	0003	004205	KDJ	0003	004206	KRX	0003	004207	KS	0003	004210	KSV	
0003	004211	KCY	0003	I	004212	MWYA	0003	004213	N	0003	004214	NNN	0003	004215	NPVA
0003	004216	P	0003	004217	PRS	0003	004623	PM	0003	004624	QI	0003	004625	R	
0003	004626	RA	0003	004627	RFD	0003	004630	RHZ	0003	005274	RL	0003	005275	RLH	
0003	005641	RM	0003	005642	RZT	0003	005643	S	0003	005644	SAVE	0003	005645	SLDTPM	
0003	006256	SLM	0003	R	006252	SMALLT	0003	006253	SZRO	0003	006254	T	0003	006255	TE
0003	006256	TMSD	0003	006257	U	0003	006260	V	0003	006261	V7RO	0003	R	006262	WT
0003	006263	X	0003	R	006264	XE	0003	006265	Y	0003	006575	Z	0003	006576	ZRFR
0003	006577	ZRSTZ	0003	006600	ZLMT										

00101	1*	BLOCK DATA	000000
00102	2*	COMMON /CLOUD/	000000
00102	3*	1ALT(260) ,ATP(260)	000000
00102	4*	2CX(10,90) ,C2	000000
00102	5*	3DRM	000000
00102	6*	4DT	000000
00102	7*	5EK	000000
00102	8*	6GRV(260) ,HLR	000000
00102	9*	7KDI	000000
00102	10*	8N	000000
00102	11*	9QI	000000
00102	12*	1RLH(260) ,RM	000000
00102	13*	2SLM(260) ,SMALLT	000000
00102	14*	3U	000000
00102	15*	4Y(200) ,Z	000000
00103	16*	DATA XE/0.0/	000000
00105	17*	DATA CHANGE,CMLR ,DST0,DST1,DST2 , SMALLT , WT , N , MWYA	000000
00105	18*	1 / 100. , 0.0,0625,0.5 ,5.0 , 0.0 , 0.0, 1 , 1 /	000000
00117	19*	END	000000

END OF COMPT, ATTON: NO DIAGNOSTICS.

310R05 CASABODRA.CPDR0  
FOR 50F3-04/11/76-11:07:46 (..)

SUBROUTINE CPFR ENTRY POINT 000205

STORAGE USED: CODE(1) 000011; DATA(0) 000100; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SFT1 002123  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 NWDR01  
0006 NI021  
0007 XPRR  
0010 ALOC10  
0011 NERR35

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000005	1076	0001	000043	1276	0001	000150	1626	0001	000130	3L	0001	000076	701L															
0000	000025	758F	0001	000107	760L	0001	000174	8L	0001	000024	900L	0001	000014	902L															
0000	000013	903F	0000	R	000010	A	0000	000000	ALT	0004	000404	ATP	0004	001010	AN														
0000	000011	C	0003	000000	CAY	0000	R	000006	CORR	0004	001011	CG	0004	001321	CHANGE														
0004	R	001322	CWLR	0004	001323	CX	0004	003127	C2	0004	003130	C3	0004	003131	C6														
0000	R	000012	D	0004	001332	DEK	0003	000001	DETID	0003	000015	DTAM	0003	000326	DMEAN														
0004	003133	DJIN	0003	000327	DNS	0004	003147	DPM	0004	003150	DS	0004	R	003151	DST														
0004	003152	DSTN	0004	003153	DST1	0004	003154	DST2	0004	003155	DT	0004	003156	DJ	0004	003157	DJ												
0004	003157	DXT	0004	003160	DX	0004	003161	DZ	0004	003162	ED	0004	003163	EK	0004	003164	EK												
0004	003164	EPS	0004	003165	ES	0004	003166	ETA	0004	003167	ET	0004	003168	ET	0004	003169	ET												
0003	000331	FMASS	0000	R	000002	FROG	0004	003573	FW	0004	003574	GPV	0003	001170	HFIGHT	0003	001171	HFIGHT											
0004	004200	HLP	0004	004201	HOR	0004	000641	INDISTR	0003	000642	IFVEC	0003	000643	ISOUT	0003	000644	ISOUT	0003	000645	ISOUT									
0004	004202	IPAM	0004	004203	IRAD	0004	004204	KCLD	0004	004205	KOI	0004	004206	KRX	0004	004207	K5	0004	004208	K5									
0000	I	000000	J	0004	004211	MCX	0004	I	004212	MWYA	0004	004213	N	0003	I	000646	NDSTR	0003	I	000647	NDSTR								
0003	001172	NH000	0004	004214	NNN	0004	004215	NPVA	0004	004216	P	0004	004217	PRS	0004	004218	PRS	0004	004219	PRS	0004	004220	PRS						
0003	000647	PS	0000	R	000003	PSIZE	0004	004623	PW	0004	004624	PT	0000	R	000007	QLOGA	0000	R	000008	QLOGA	0000	R	000009	QLOGA					
0004	R	004625	RA	0004	004626	RA	0004	004627	RFD	0004	004628	RH7	0004	005234	RL	0004	005235	RL	0004	005236	RL	0004	005237	RL					
0004	005235	RIH	0004	005641	RM	0004	005642	R7T	0004	005643	S	0004	005644	SAVE	0004	005645	SAVE	0004	005646	SAVE	0004	005647	SAVE	0004	005648	SAVE			
0003	001157	SD	0004	005645	SLOTMP	0004	005646	SLM	0004	005647	SLM	0004	005648	SLM	0004	005649	SLM	0004	005650	SLM	0004	005651	SLM	0004	005652	SLM			
0004	006253	S7RO	0004	R	006254	T	0004	006255	TE	0003	001161	TWE	0003	001162	TMP1	0003	001163	TMP1	0003	001164	TMP1	0003	001165	TMP1	0003	001166	TMP1		
0003	001163	TMP2	0004	006256	TMSD	0004	006257	T2M	0003	001164	T2M	0003	001165	T2M	0003	001166	T2M	0003	001167	T2M	0003	001168	T2M	0003	001169	T2M			
0004	R	006260	V	0000	R	000001	VIS	0000	R	000002	V1	0003	R	000003	V2	0003	R	000004	V3	0003	R	000005	V4	0003	R	000006	V5		
0003	002013	VY	0004	006261	VZRO	0004	006262	XE	0004	006263	Y	0004	R	006264	Z	0004	R	006265	Z	0004	R	006266	Z	0004	R	006267	Z		
0004	006263	X	0004	006264	XE	0004	006265	Y	0004	006266	Z	0004	R	006267	Z	0004	R	006268	Z	0004	R	006269	Z	0004	R	006270	Z		
0004	006577	ZARSTZ	0004	006578	ZARSTZ	0004	006579	ZARSTZ	0004	006580	ZARSTZ	0004	006581	ZARSTZ	0004	006582	ZARSTZ	0004	006583	ZARSTZ	0004	006584	ZARSTZ	0004	006585	ZARSTZ	0004	006586	ZARSTZ
0004	006577	ZARSTZ	0004	006578	ZARSTZ	0004	006579	ZARSTZ	0004	006580	ZARSTZ	0004	006581	ZARSTZ	0004	006582	ZARSTZ	0004	006583	ZARSTZ	0004	006584	ZARSTZ	0004	006585	ZARSTZ	0004	006586	ZARSTZ
0004	006577	ZARSTZ	0004	006578	ZARSTZ	0004	006579	ZARSTZ	0004	006580	ZARSTZ	0004	006581	ZARSTZ	0004	006582	ZARSTZ	0004	006583	ZARSTZ	0004	006584	ZARSTZ	0004	006585	ZARSTZ	0004	006586	ZARSTZ

00101

1\*

SUBROUTINE CPFR

CPFR 001

00000F



```

00147 768 FORMT(//DAVIES EQUATIONS ARE INAC-UPATE FOR *.F12.3*.MICROMETERS 059 00007*
00148 1AT*.E12.3*.METERPS) 060 00007*
00149 60 TO 760 061 00007*
00150 062 062 00007*
00151 063 063 00010*
00152 064 064 00010*
00153 065 065 00010*
00154 066 066 00011*
00155 067 067 00011*
00156 068 068 00013*
00157 069 069 00013*
00158 070 070 00013*
00159 071 071 00013*
00160 072 072 00013*
00161 073 073 00013*
00162 074 074 00013*
00163 075 075 00013*
00164 076 076 00013*
00165 077 077 00013*
00166 078 078 00013*
00167 079 079 00013*
00168 080 080 00021*

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END OF C.MPT. ACTION: NO DIAGNOSTICS.

3:FOR.S CASSANDRA.CPVX.R  
FOR 50FA-06/11/76-10:09:29 (1.)

SUBROUTINE CPV ENTRY POINT 000506

STORAGE USED: CODE(1) 000514; DATA(0) 000113; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SFT1 002323  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 TRPL  
0006 XPRR  
0007 FXP  
0010 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000250	17L	0001	000424	176G	0001	000011	21L	0001	000017	22L	0001	00006	25L														
0001	000066	26L	0001	000167	6L	0001	000203	7L	0004	000000	ALT	0004	R	000400	ATP													
0004	R	001010	80	000000	CAY	0004	R	001011	CG	0004	R	001321	CHANGF	0004	001322	CMLR												
0004	001323	CX	0004	R	003127	C2	0004	R	003130	C3	0004	R	003131	C6	0004	003132	DEK											
0003	000001	DETID	0003	000015	DIAM	0003	000326	DMEAN	0004	R	003133	DNID	0003	000327	DNS	0003	000327	DNS										
0004	003147	DRM	0004	003150	DS	0004	R	003151	DST	0004	R	003152	DSTO	0004	003153	DSTI	0004	003153	DSTI									
0004	003154	DST2	0004	003155	DT	0004	R	003156	DU	0004	R	003157	DWT	0004	003160	DX	0004	003160	DX									
0004	003161	DZ	0004	003162	ED	0004	R	003163	EK	0004	R	003164	FPS	0004	003165	FS	0004	003165	FS									
0004	003166	ETA	0003	000330	EXPO	0004	R	003572	F	0003	R	000331	FWASS	0004	R	000004	FO	0004	000004	FO								
0004	003573	FW	0004	003574	GRV	0004	R	001170	HEIGHT	0004	R	004200	HLR	0004	004201	HOR	0004	004201	HOR	0004	004201	HOR						
0003	000641	INISTR	0003	000642	IEEXEC	0000	000076	INJP\$	0000	000076	IPAM	0004	R	004203	IRAD	0004	004204	KCLD	0004	004204	KCLD							
0003	000643	IRISE	0003	000644	ISIN	0003	000645	ISOUT	0003	000645	ISOUT	0004	I	000010	J	0004	004211	MCX	0004	004211	MCX							
0004	004205	KDI	0004	004206	KRX	0004	004207	KS	0004	004207	KS	0004	004210	KSV	0004	004211	NNN	0004	004211	NNN	0004	004211	NNN					
0004	004212	MMYA	0004	004213	N	0004	I	000646	NDSTR	0003	I	000646	NDSTR	0003	001172	NHODO	0004	R	004217	PRS	0004	R	004217	PRS				
0004	T	004215	NPVA	0000	R	000000	O	0004	R	004216	P	0004	R	004216	PHI	0004	R	004217	PRS	0004	R	004217	PRS	0004	R	004217	PRS	
0003	R	000647	PS	0004	R	004623	PW	0004	R	000007	Q	0004	R	004624	QT	0004	R	004625	R	0004	R	004625	R	0004	R	004625	R	
0004	004626	RA	0004	R	004627	REFD	0004	R	004630	RHZ	0004	R	004630	RHZ	0004	R	005244	RLH	0004	R	005245	RLH	0004	R	005245	RLH		
0004	005641	RM	0000	R	000005	RMAO	0000	R	000006	RWMO	0004	R	005642	R7T	0004	R	005643	S	0004	R	005643	S	0004	R	005643	S		
0004	005644	SAVE	0003	001157	SD	0004	R	005645	SLDTMP	0004	R	005646	SLM	0004	R	006254	T	0004	R	006255	TAD	0004	R	006255	TAD			
0000	R	000003	SOILHT	0003	R	001160	SSAM	0004	R	006253	SZRO	0004	R	006254	T	0004	R	006255	TAD	0004	R	006255	TAD	0004	R	006255	TAD	
0004	R	006255	TE	0003	R	001161	TWE	0004	R	006256	U	0004	R	006257	V	0004	R	006258	V	0004	R	006259	V	0004	R	006259	V	
0000	R	000002	TPR	0004	R	006257	U	0004	R	006258	V	0004	R	006259	V	0004	R	006260	V	0004	R	006261	V	0004	R	006261	V	
0003	001503	VX	0003	002013	VY	0004	R	006261	V7RO	0004	R	006262	Y	0004	R	006263	Z	0004	R	006264	Z	0004	R	006265	Z			
0004	R	006263	Z	0004	R	006264	XE	0004	R	006265	Y	0004	R	006266	Y	0004	R	006267	Y	0004	R	006268	Y	0004	R	006269	Y	
0004	R	006577	ZARSTZ	0004	R	006600	ZLMT	0003	001171	Z5CL	0003	001172	ZV	0003	001173	ZV	0003	001174	ZV	0003	001175	ZV	0003	001176	ZV	0003	001177	ZV

00101 1\* SUBROUTINE CPV  
00101 2\* C  
00101 3\* C 13 OCTOBER 1970

CPV 001  
CPV 002  
CPV 003

000000  
000000  
000000

```

00101 000000 004
00102 000000 005
00103 000000 006
00104 000000 007
00105 000000 008
00106 000000 009
00107 000000 010
00108 000000 011
00109 000000 012
00110 000000 013
00111 000000 014
00112 000000 015
00113 000000 016
00114 000000 017
00115 000000 018
00116 000000 019
00117 000000 020
00118 000000 021
00119 000000 022
00120 000000 023
00121 000000 024
00122 000000 025
00123 000000 026
00124 000000 027
00125 000000 030
00126 000000 031
00127 000000 032
00128 000000 033
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00132 000000 037
00133 000000 038
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00135 000000 040
00136 000000 041
00137 000000 042
00138 000000 043
00139 000000 044
00140 000000 045
00141 000000 046
00142 000000 047
00143 000000 048
00144 000000 049
00145 000000 050
00146 000000 051
00147 000000 052
00148 000000 053
00149 000000 054
00150 000000 055
00151 000000 056
00152 000000 057
00153 000000 058
00154 000000 059
00155 000000 060

```

INITIALIZE CLOUD AND PARTICLE VARIABLES  
 COMND /SET1/  
 1CAY ,DETID(12) ,DIAM(200) ,DMEAN  
 2EMASC(200) ,IDISTO ,IRISE  
 3NOSTR ,PS(200) ,SSAW  
 4TAP2 ,PHI ,USOIL ,VPR  
 5ZSCL ,NH2O ,VX(200)  
 COMMON /CLOUD/  
 1ALT(260) ,ATP(260) ,R0  
 2CX(10,90) ,C2 ,C6  
 3DRM ,DS ,DST0  
 4DT ,DU ,DWT ,DX  
 5EK ,EPS ,ETA(260)  
 6SPV(260) ,HLR ,IPAW  
 7KRI ,KRX ,KSV  
 8N ,NNV ,NDVA  
 9OT ,P ,RA  
 10LH(260) ,RM ,REF  
 11SLM(260) ,SMALL ,S  
 12U ,V ,S7R0  
 13V ,VZRO  
 14Y(200) ,Z ,ZREF  
 15Z ,ZBPTZ  
 16Z ,ZMLR  
 17Z ,ZMLR(12)  
 18Z ,ZMLR(12)  
 19Z ,ZMLR(12)  
 20Z ,ZMLR(12)  
 21Z ,ZMLR(12)  
 22Z ,ZMLR(12)  
 23Z ,ZMLR(12)  
 24Z ,ZMLR(12)  
 25Z ,ZMLR(12)  
 26Z ,ZMLR(12)  
 27Z ,ZMLR(12)  
 28Z ,ZMLR(12)  
 29Z ,ZMLR(12)  
 30Z ,ZMLR(12)  
 31Z ,ZMLR(12)  
 32Z ,ZMLR(12)  
 33Z ,ZMLR(12)  
 34Z ,ZMLR(12)  
 35Z ,ZMLR(12)  
 36Z ,ZMLR(12)  
 37Z ,ZMLR(12)  
 38Z ,ZMLR(12)  
 39Z ,ZMLR(12)  
 40Z ,ZMLR(12)  
 41Z ,ZMLR(12)  
 42Z ,ZMLR(12)  
 43Z ,ZMLR(12)  
 44Z ,ZMLR(12)  
 45Z ,ZMLR(12)  
 46Z ,ZMLR(12)  
 47Z ,ZMLR(12)  
 48Z ,ZMLR(12)  
 49Z ,ZMLR(12)  
 50Z ,ZMLR(12)  
 51Z ,ZMLR(12)  
 52Z ,ZMLR(12)  
 53Z ,ZMLR(12)  
 54Z ,ZMLR(12)  
 55Z ,ZMLR(12)  
 56Z ,ZMLR(12)  
 57Z ,ZMLR(12)  
 58Z ,ZMLR(12)  
 59Z ,ZMLR(12)  
 60Z ,ZMLR(12)

20 C2=0.075  
 21 C2=0.065\*\*(-.24)  
 22 C3=0.175  
 23 C6=1.0  
 T=TMP1  
 COMPUTE INITIAL RISE VELOCITY  
 0=0.409\*\*0.071-1.0  
 U=(2/3\*\*0.018)\*(TME\*\*0)  
 COMPUTE INITIAL TURBULENT KINETIC ENERGY DENSITY  
 EK=0.5\*U\*\*2  
 COMPUTE FRACTION OF DETONATION ENERGY YIELD IN CLOUD  
 AT INITIAL TIME  
 IS THIS A HIGH EXPLOSIVE BURST  
 IF (F.EQ. 0.0 ) GO TO 25  
 F=1.0  
 GO TO 26  
 25 CONTINUE  
 F=0.4406\*\*0.01422

```

00127 61* 26 CONTINUE CPV 056 000060
00130 62* 26 COMPUTE CLOUD CENTER HEIGHT, VOLUME, RADII, INITIAL MIXING RATIO CPV 057 000061
00130 63* 26 CPV 058 000062
00130 64* 26 CPV 059 000063
00131 65* 26 CPV 060 000064
00132 66* 26 CPV 061 000065
00133 67* 26 CPV 062 000066
00134 68* 26 CPV 063 000067
00135 69* 26 CPV 064 000068
00136 70* 26 CPV 065 000069
00137 71* 26 CPV 066 000070
00138 72* 26 CPV 067 000071
00139 73* 26 CPV 068 000072
00140 74* 26 CPV 069 000073
00141 75* 26 CPV 070 000074
00142 76* 26 CPV 071 000075
00143 77* 26 CPV 072 000076
00144 78* 26 CPV 073 000077
00145 79* 26 CPV 074 000078
00146 80* 26 CPV 075 000079
00147 81* 26 CPV 076 000080
00148 82* 26 CPV 077 000081
00149 83* 26 CPV 078 000082
00150 84* 26 CPV 079 000083
00151 85* 26 CPV 080 000084
00152 86* 26 CPV 081 000085
00153 87* 26 CPV 082 000086
00154 88* 26 CPV 083 000087
00155 89* 26 CPV 084 000088
00156 90* 26 CPV 085 000089
00157 91* 26 CPV 086 000090
00158 92* 26 CPV 087 000091
00159 93* 26 CPV 088 000092
00160 94* 26 CPV 089 000093
00161 95* 26 CPV 090 000094
00162 96* 26 CPV 091 000095
00163 97* 26 CPV 092 000096
00164 98* 26 CPV 093 000097
00165 99* 26 CPV 094 000098
00166 100* 26 CPV 095 000099
00167 101* 26 CPV 100 000100
00168 102* 26 CPV 101 000101
00169 103* 26 CPV 102 000102
00170 104* 26 CPV 103 000103
00171 105* 26 CPV 104 000104
00172 106* 26 CPV 105 000105
00173 107* 26 CPV 106 000106
00174 108* 26 CPV 107 000107
00175 109* 26 CPV 108 000108
00176 110* 26 CPV 109 000109
00177 111* 26 CPV 110 000110
00178 112* 26 CPV 111 000111
00179 113* 26 CPV 112 000112
00180 114* 26 CPV 113 000113
00181 115* 26 CPV 114 000114
00182 116* 26 CPV 115 000115
00183 117* 26 CPV 116 000116

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REFORMS CASSANDRA, 000000  
FOR 5063-0-11/76-10:09:40 (1.1)

SUBROUTINE CRWV ENVY POINT 000103

STORAGE USED: CODE(1) 000111; DATA(0) 000152; BLANK COMM-N(2) 000000

COMMON BLOCKS:

0003 SET1 002123  
0004 CLOW 005601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 NI00US  
0006 NI02E  
0007 NI02E\$  
0010 ALOG  
0011 FXP  
0012 NI01E  
0013 NI01E\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000020	1L	0001	000056	1246	0001	000062	1276	0001	000047	2L	0001	000001	BARMI	
0000	000005	3E	0000	000043	8F	0004	000000	ALT	0004	000404	ATP	0004	000001	BARMI	
0004	001010	RD	0003	000000	CAY	0004	001011	C6	0004	001321	CHANGF	0004	001322	CMLR	
0004	001323	CK	0004	00127	C2	0004	003130	C3	0004	003131	CA	0004	003132	DEFK	
0003	000001	DETID	0003	000015	DIAM	0003	R	DMEAN	0004	003133	DNID	0003	000327	DNS	
0004	003147	DRM	0004	003150	DS	0004	003151	DST	0004	003152	DST0	0004	003153	DST1	
0004	003154	DST2	0004	003155	DT	0004	003156	DU	0004	003157	DWT	0004	003160	DY	
0004	003161	DZ	0004	003162	ED	0004	003163	EK	0004	000002	EMI	0004	003164	FPS	
0004	003165	ES	0004	003166	ETA	0003	000330	EXPO	0004	003572	F	0003	000331	FMASS	
0004	003573	FV	0004	003574	GRV	0003	001170	HEIGHT	0004	004200	HLR	0004	004201	HOR	
0000	I	000004	I	000641	IDISTR	0003	000642	IFXFC	0004	000137	INJPS	0004	004202	IPAM	
0004	004203	IRAD	0003	000643	IRISE	0003	000644	ISIN	0003	I	ISOUT	0004	000003	J	
0004	004204	KCLN	0004	004205	KDI	0004	004206	KRX	0004	000645	KSC	0004	004210	KSV	
0004	I	004211	MCX	0004	004212	MMYA	0004	004213	N	0003	000646	NDSTR	0003	001172	NH000
0004	004214	NNN	0004	004215	NPVA	0004	004216	P	0004	004217	PPS	0003	000647	PS	
0004	004623	PM	0004	004624	PI	0004	004625	R	0004	004626	RA	0004	004627	RFD	
0004	004630	RHZ	0004	005234	RL	0004	005235	RLH	0004	005641	RM	0004	005642	RZT	
0004	005643	S	0004	005644	SAVE	0003	R	SLN	0004	000000	STGMA	0004	005645	SLDTMP	
0004	005646	SLM	0004	006252	SMALLT	0003	001160	SSAM	0004	006253	SZRO	0004	006254	T	
0004	006255	TF	0003	001161	TME	0003	001162	TMP1	0003	001163	TMP2	0004	006256	TWSD	
0004	001164	TSM	0004	006257	U	0003	001165	USOTL	0004	006260	V	0003	001166	VPR	
0003	001503	VX	0003	002013	VY	0004	006261	V7R0	0003	001167	W	0004	006262	WT	
0004	006263	X	0004	006264	XE	0004	006265	Y	0004	006575	Z	0004	006576	ZPRR	
0004	006577	ZPRSTZ	0004	006500	ZLWT	0003	001171	ZSCL	0003	001173	ZV				

00101 1\* SUBROUTINE CRWV

CPWV 001 000002

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000101 2*
000101 3*
000101 4*
000101 5*
000101 6*
000101 7*
000101 8*
000101 9*
000103 10*
000103 11*
000103 12*
000103 13*
000103 14*
000103 15*
000104 16*
000104 17*
000104 18*
000104 19*
000104 20*
000104 21*
000104 22*
000104 23*
000104 24*
000104 25*
000104 26*
000104 27*
000104 28*
000104 29*
000104 30*
000104 31*
000105 32*
000105 33*
000105 34*
000106 35*
000106 36*
000107 37*
000107 38*
000107 39*
000107 40*
000107 41*
000107 42*
000107 43*
000107 44*
000107 45*
000107 46*
000107 47*
000107 48*
000110 49*
000112 50*
000113 51*
000114 52*
000115 53*
000116 54*
000122 55*
000134 56*
000135 57*

*****
CRMW PRINTS SUMMARY OF OUTPUT OF THE CLOUD RISE MODULE.
*****
COMMON /SET1/
ICAY ,DETID(12) ,DIAM(201) ,DMFAN ,DNS ,FXPO ,CRMW 002
2FMASG(200),IDISTR ,IEVEC ,ISIN ,ISOUT ,CRMW 003
3NOSTR ,PS(200) ,SD ,SSAW ,TMP1 ,CRMW 004
4TWP2 ,TZM ,USOIL ,VPR ,WE ,HEIGHT ,CRMW 005
5ZSCCL ,NHQDQ ,ZV(200) ,VY(200) ,CRMW 006
6COMMON /CLOUD/ ,CRMW 007
7ALT(260) ,ATP(260) ,RN ,CG(200) ,CHANGE ,CRMW 008
8C2X(10,90) ,C2 ,C3 ,DEK ,DNIN(12) ,CRMW 009
9DRM ,DS ,DST ,DST0 ,DEK ,CRMW 010
10DU ,DWT ,DX ,DZ ,CRMW 011
11EPS ,ETA(260) ,F ,FW ,CRMW 012
12HLR ,HQR ,IPAM ,IRAD ,MCX ,MYA ,CRMW 013
13KRX ,KS ,NPVA ,P ,PRS(260) ,PW ,CRMW 014
14NNN ,R ,RA ,RFT ,RHZ(260) ,RL ,CRMW 015
15RM ,SZRO ,S ,SAVE ,SLDTMP ,CRMW 016
16SMALLT ,SMALLT ,T ,TE ,TMSN ,CRMW 017
17V ,VZRO ,WT ,XE ,CRMW 018
18Z ,ZBFR ,ZBRSTZ ,XLMT ,CRMW 019
19Z ,CRMW 020
20CRMW 021
21CRMW 022
22CRMW 023
23CRMW 024
24CRMW 025
25CRMW 026
26CRMW 027
27CRMW 028
28CRMW 029
29CRMW 030
30CRMW 031
31CRMW 032
32CRMW 033
33CRMW 034
34CRMW 035
35CRMW 036
36CRMW 037
37CRMW 038
38CRMW 039
39CRMW 040
40CRMW 041
41CRMW 042
42CRMW 043
43CRMW 044
44CRMW 045
45CRMW 046
46CRMW 047
47CRMW 048
48CRMW 049
49CRMW 050
50CRMW 051
51CRMW 052
52CRMW 053
53CRMW 054
54CRMW 055
55CRMW 056
56CRMW 057

*****
3 FORMAT(//,10X,'PARAMETERS FOR THE LOGNORMAL PARTICLE DIAMETER-MASS CRMW 002
1 FREQUENCY DISTRIBUTION',/10X,'GEOMETRIC MEAN ='E12.5,MICROMETERS CRMW 003
2',10X,'GEOMETRIC STANDARD DEVIATION ='E12.5)
008 FORMAT (/HI ////
1 10X41HCLOUD RISE AND EXPANSION HISTORY TABLE CX//1X)
20 FORMAT(
1 49X19HCLOUD HISTORY TABLE//
1 5X(3XSHCLOUD, 3X), 3X4HBASE, 8X34TOP, 7X6HRADIAL, CRMW 038
2 3X11HTEMPATURE,4X, 3HGAS/ CRMW 039
3 8X4HTIME, 5X8HINTERVAL, 5X4HBASE, 8X34TOP, 6X6HRADIUS, CRMW 040
4 3X(3X4HRATE, 4X), 14X, 7HDENSITY/ CRMW 041
5 5X(3X4HSEC), 3X), 3(4X3H(W), 4X), 3(2X7H(W/SEC), 2X),4X, CRMW 042
6 3H(K),5X10H (KG/M**3)// (1X)2, 1H), 1X, 1P10E11.4)) CRMW 043
*****
*****
*****
WRITE(ISOUT,B)
GO TO (1,2,2),IDISTR
1 SIGMA=ALOG(SD)
BARMI=ALOG(DMEAN)*3.*SIGMA*2
EMU=EXP(BARMU)
WRITE(ISOUT,3)EWJ,SD
2 WRITE(ISOUT,20)(J,(CX(I,J),I=1,10),(=1,MCX)
RETURN
END

```

0:EURS CASSAUBRA.CRM.V2  
FOR 5063-06/11/76-11:10:00 (1)

CURRENTIVE CRM ENTRY POINT 000221

STORAGE USED: C (0) 000005; DATA (0) 000046; BLANK COMMON (2) 000000

COMMON BLOCKS:

0003 SET1 002223  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 CPU  
0006 RSTR  
0007 RKGILL  
0010 CPER  
0011 DRG  
0012 CCSN  
0013 CPN  
0014 CRWN  
0015 RNDUE  
0016 RUC2\$  
0017 EXP  
0020 XPRR  
0021 NERR2\$  
0022 SORT  
0023 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000167	114AL	0001	000105	1266	0001	000165	146L	0001	000206	148L	0001	000062	150L
0001	000144	1531L	0001	000073	1532L	0001	000010	35L	0001	000002	522F	0001	000203	724L
0001	000171	AL	0001	000127	87L	0001	000131	8AL	0001	000156	901L	0004	000000	ALT
0004	000404	ATP	0004	001010	R0	0003	000000	CAY	0004	001011	CG	0004	001321	CHANGE
0004	001322	CWLR	0004	001323	CX	0004	000015	DIAM	0004	003127	C2	0004	001321	C6
0004	003132	CFK	0004	000001	DETID	0003	000015	DIAM	0004	003127	C2	0004	003133	DNID
0003	000327	DNS	0004	003147	DRM	0004	003150	DS	0004	003151	DST	0004	003152	DST0
0004	R 003153	DST1	0004	003154	DST2	0004	003155	DT	0004	R 003151	DST	0004	003157	DWT
0004	R 003160	DX	0004	003161	DZ	0004	003162	ED	0004	003163	FK	0004	003164	FPS
0004	R 003165	ES	0004	003166	ETA	0003	000330	EXP0	0004	R 003172	F	0003	000331	FMASS
0004	003573	FW	0004	003574	GRV	0003	001170	HEIGHT	0004	004200	HLP	0004	004201	HOR
0003	000641	INDSTR	0003	000642	IEVEC	0000	000036	INJPS	0004	004202	IPAM	0004	004203	IRAN
0003	000643	IRISE	0003	000644	ISIN	0003	I 000645	ISOUT	0004	I 000001	J	0004	I 004204	KCLD
0004	004205	KDI	0004	004206	KRX	0004	004207	KS	0004	I 004210	KSV	0004	004211	MCX
0004	I 004212	MWYA	0004	I 004213	N	0003	I 000646	NSTR	0003	001172	NH000	0004	004214	NNN
0004	004215	NPVA	0004	R 004216	P	0004	R 004217	PRS	0003	000647	PS	0004	R 004218	PW
0004	004624	OI	0004	R 004625	R	0004	R 004626	RA	0004	004627	RFD	0004	R 004628	P4Z
0004	005234	RL	0004	005235	RLH	0004	R 005641	RV	0004	R 005642	R7T	0004	R 005643	S
0004	005644	SAVF	0003	001157	SD	0004	R 005645	SLDTMP	0004	005646	SLM	0004	R 006252	SMALLY
0003	001160	SSAW	0004	006253	SZRO	0004	R 006254	T	0004	006255	TF	0003	001161	TWE
0003	001162	TMP1	0003	001163	TMP2	0004	006256	TvSD	0004	001164	T2M	0004	006257	U

0003 001503 VX  
0004 R 006263 X  
0004 006577 ZARSTZ

0000 R 000000 VTEMPY  
0004 R 006262 WT  
0004 006576 ZBFR

0003 001166 VPR  
0003 001167 W  
0004 006575 Z  
0003 001173 ZV

0004 R 006260 V  
0004 006261 VZPO  
0004 R 006265 Y  
0003 001171 ZSCL

001165 JSCYL  
002013 VY  
006264 XF  
006600 ZLMT

```

00101 1* SUBROUTINE CRM
00101 2* COMMON /SET1/
00103 3* 1CAY ,DETID(12) ,DIAM(201) ,DMEAN ,DNS ,FXPO
00103 4* 2FVASS(200) ,IDISTR ,IEXEC ,IRISE ,ISIN ,TSOUT
00103 5* 3NDSTR ,PS(200) ,SD ,SSAM ,TME ,TMPL
00103 6* 4TWP2 ,T2M ,USOIL ,VPR ,W ,HEIGHT
00103 7* 5ZSCL ,NHODD ,ZV(200) ,VX(200) ,VY(200)
00103 8* COMMON /CLOUD/
00104 9* 1ALT(260) ,ATP(260) ,B0 ,CG(200) ,CHANGE ,CMLR
00104 10* 2CX(10,90) ,C2 ,C3 ,C6 ,DEK ,DNID(12)
00104 11* 3DRM ,DS ,DST ,DST1 ,DST2 ,DST3
00104 12* 4DT ,DIJ ,DWT ,DZ ,FD ,FW
00104 13* 5EK ,EPS ,ES ,ETA(260) ,F ,IPAM ,KCLD
00104 14* 6GRV(260) ,HLR ,HOR ,IPAM ,KSV ,MXYA
00104 15* 7KDI ,KRX ,KS ,KVA ,MCX ,PW
00104 16* 8N ,NNN ,NPVA ,PR(260) ,R
00104 17* 9QI ,R ,RA ,RHZ(260) ,RL
00104 18* 1RLH(260) ,RM ,RZT ,SAVF ,SLDTP
00104 19* 2SLM(260) ,SMALLT ,SZRO ,T ,TE ,TMSD
00104 20* 3U ,V ,VZRO ,WT ,X ,XE
00104 21* 4Y(200) ,Z ,ZBFR ,ZBRSTZ ,ZLMT
00104 22*
00104 23*
00105 24* 532 FORMAT('11.9X',FRACTION OF THE DETONATION ENERGY YIELD IN THE CLOUD)
00105 25* 1D AT INITIAL TIME IS,E12.5)
00105 26*
00105 27* CALL CPV TO SET UP THE INITIAL CLOUD VARIABLES
00105 28*
00105 29* CALL CPV
00106 30* WRITE(I5OUT,532)F
00107 31*
00107 32* COMPUTE THE PARTIAL PRESSURE OF THE WATER VAPOR IN THE CLOUD
00107 33*
00107 34* 35 PW=P*X*29./((18.+29.*X)
00112 35*
00112 36* COMPUTE SATURATION WATER VAPOR PRESSURE AND CLOUD ATR MASS
00112 37*
00112 38* ES=611.*(T/273.)**(-5.13)*EXP((25.*(T-273.))/T)
00113 39* RA=RW/V*(1.+X)/(1.+X+WT)
00114 40*
00114 41* WET OR DRY EQUATIONS
00114 42*
00114 43* GO TO (150,153,1531),N
00115 44* 150 IF(ES-PW)152,152,1531
00116 45*
00116 46* STORE VARIABLES(KSV=1) OR RESTART AT PREVIOUS TIME STEP (KSV=2)
00116 47*
00116 48* 152 KSV=2
00121 49*

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00122	50*	1512 CALL DSTEP	CPM	050	00007*
00123	51*	9 VTE=VTEV	CPM	051	000074
00123	52*		CPM	052	000074
00123	53*	INTEGRATE	CPM	053	000074
00123	54*		CPM	054	000074
00124	55*	CALL PKGILL	CPM	055	000074
00124	56*		CPM	056	000074
00124	57*	ADJUST IN-CLOUD PARTICLE CONCENTRATIONS TO BE CONSISTENT WITH	CPM	057	000074
00124	58*	CLOUD VOLUME CHANGE	CPM	058	000074
00124	59*		CPM	059	000074
00125	60*	DO 94 J=1,NDSR	CPM	060	000100
00130	61*	95 Y(J)=Y(J)*VTEMPY/V	CPM	061	000100
00130	62*		CPM	062	000100
00130	63*	ACCUMULATE CLOUD TIME	CPM	063	000100
00130	64*		CPM	064	000100
00132	65*	SMALLT=SMALLT+DST	CPM	065	000111
00132	66*		CPM	066	000111
00132	67*	TEST FOR TIME STEP CHANGE	CPM	067	000111
00133	68*	IF(AND(SMALLT-1.0).LT.0.001)GO TO 87	CPM	068	000114
00135	69*	IF(SMALLT-1.0)9,87,88	CPM	069	000121
00140	70*	87 DST=DST1	CPM	070	000127
00141	71*	88 R=SQRT(3.*V/(RZT*12.5663706F01))	CPM	071	000131
00142	72*	GO TO 35	CPM	072	000142
00142	73*		CPM	073	000142
00142	74*	COMPUTE PARTICLE FALLOUT RATE	CPM	074	000142
00142	75*		CPM	075	000142
00143	76*	1531 CALL CPER	CPM	076	000144
00144	77*	GO TO (901,901,R),WVYA	CPM	077	000144
00145	78*	901 GO TO (1146,146),KCLD	CPM	078	000154
00146	79*	146 CALL DBG	CPM	079	000162
00147	80*	1146 CALL DCPN	CPM	080	000167
00150	81*	8 CALL CXPV	CPM	081	000171
00151	82*	GO TO (724,724,148),WVYA	CPM	082	000172
00152	83*	724 KSV=1	CPM	083	000204
00153	84*	GO TO 1532	CPM	084	000204
00154	85*	148 CALL CRWV	CPM	085	000204
00155	86*	RETURN	CPM	086	000207
00156	87*	END	CPM	087	000224

END OF C.MPT. ATION: NO DIAGNOSTICS.

QIFORAS CASSANDRA.CYPN.R  
FOR 50F3-06/11/76-12:11:51 (1)

SUBROUTINE CYPN ENTRY POINT 000303

STORAGE USED: CODE(1) 300\*10; DATA(0) 000054; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SET1 002323  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 NERR2\$  
0006 ALOG  
0007 FXP  
0010 NWDUS  
0011 NIO2\$  
0012 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000224	100L	0001	000012	1136	0001	000012	1166	0001	000010	2L	0001	000047	20L											
0001	000242	217G	0001	000264	2276	0001	000141	343L	0001	000044	40L	0001	000047	42L											
0001	000061	43L	0000	000015	5000F	0001	000172	62L	0001	000203	65L	0001	000211	68L											
0001	000221	70L	0004	000000	ALT	0004	000404	ATP	0004	001010	RN	0000	000000	CAY											
0004	001011	C6	0004	001321	CHANGE	0004	001322	CMLR	0004	R	001323	CX	0000	000012	CXM										
0004	000015	DIAM	0000	R	000004	DLTM	0003	003131	C6	0004	003132	DEK	0000	000001	DETIN										
0003	000015	DIAM	0004	003150	DS	0004	003151	DST	0004	003152	DSTO	0004	003153	DSTI											
0004	003147	DRM	0004	003155	DT	0004	003156	DU	0004	003157	DWT	0004	003160	DX											
0004	003154	DST2	0004	003162	ED	0004	003163	EK	0004	003164	EPS	0004	003165	ES											
0004	003166	ETA	0003	000330	EXPO	0004	003572	F	0003	000331	FMASS	0004	003573	FW											
0004	003574	GRV	0003	001170	HEIGHT	0004	004200	HLR	0004	004201	HGR	0003	000641	IOISTP											
0003	000642	IFXEC	0000	000042	INJPS	0004	004202	IPAM	0004	004203	IRAD	0003	000643	IRISE											
0003	000644	ISIN	0003	I	000645	ISOUT	0004	004204	KCLD	0004	004205	KDI	0004	004206	KBY										
0004	004207	KS	0004	004210	KSV	0004	I	004211	KCX	0000	I	000003	MT	0000	000002	MJ									
0000	I	000013	MK	0000	I	000014	ML	0004	004212	MWYA	0000	I	000011	NSTAT	0000	000006	NDSTR								
0003	001172	NHONO	0004	004214	NNN	0004	004215	NPVA	0000	I	000011	NSTAT	0004	004216	P	0004	004216	P							
0004	004217	PRS	0003	000647	PS	0004	004623	PW	0004	004624	QT	0004	004625	R	0004	004625	R	0004	004625	R					
0004	R	004626	RA	0004	004627	RFD	0004	004630	RHZ	0004	005234	RL	0004	005235	PLH	0004	005235	PLH	0004	005235	PLH				
0004	005641	RM	0004	R	005642	RZT	0004	005643	S	0004	005644	SAVE	0003	001157	SD	0003	001157	SD	0003	001157	SD				
0004	005645	SLDTMP	0004	005646	SLM	0004	R	006252	SMALLT	0003	001161	TME	0003	001162	TMP1	0003	001163	TMP2	0003	001164	T2M				
0004	R	006254	T	0004	006255	TE	0003	001161	TME	0003	R	001166	VPR	0003	001167	W	0003	001168	W	0003	001169	VX			
0004	006256	TMSD	0000	R	000006	TSRD	0000	R	000005	TSTM	0000	R	000010	TSTR	0000	R	000011	WORD1	0000	R	000012	WORD2			
0004	006257	U	0003	001165	US01L	0004	006260	V	0004	006261	VZRO	0003	001167	W	0004	006262	WT	0004	006263	X	0004	006264	Y		
0003	002013	VY	0004	006261	VZRO	0004	006262	X	0003	R	001167	W	0004	006264	Y	0004	006265	Z	0004	006266	AA	0004	006267	AB	
0004	006262	WT	0000	R	000007	ZA	0004	R	006576	ZBFR	0004	006577	ZBFRST	0004	006578	ZBFR	0004	006579	ZBFR	0004	006580	ZBFR	0004	006581	ZBFR
0003	001173	ZV	0004	R	006576	ZBFR	0004	R	006577	ZBFRST	0004	006578	ZBFR	0004	006579	ZBFR	0004	006580	ZBFR	0004	006581	ZBFR	0004	006582	ZBFR



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00142 57*
00143 58*
00144 59*
00145 60*
00146 61*
00146 62*
00147 63*
00152 64*
00153 65*
00154 66*
00157 67*
00160 68*
00161 69*
00165 70*
00166 71*
00167 72*
00167 73*
00170 74*
00173 75*
00174 76*
00175 77*
00201 78*
00201 79*
00201 80*
00201 81*
00202 82*
00203 83*
00204 84*
00207 85*
00210 86*
00211 87*
00211 88*
00212 89*
00213 90*
00216 91*
00216 92*
00221 93*
00221 94*
00222 95*
00223 96*
00223 97*
00224 98*
00226 99*
00231 100*
00233 101*
00234 102*

GO TO 043
042 ZA = Z
043 CX (5, MCX) = R
CX (3, MCX) = T
CX (1, MCX) = RA
C
IF (MCX-5) 343, 343, 143
143 TSTR=ABS(ALOG(CX(5, MCX)) - ALOG(CX(5, MCX-1)))
TSTR = TSTR / (CX (1, MCX) - CX (1, MCX - 1))
IF (TSTR - TSTRD) 243, 343, 343
243 MWYA = 3
NSTAT=243
WRITE(IISOUT,5000)NSTAT,WORD1
343 CX (3, MCX) = ZA - R2T
CX (4, MCX) = ZA + R2T
060 MCX = MCX + 1
C
IF (MCX - 90) 062, 062, 061
061 MWYA = 3
NSTAT=61
WRITE(IISOUT,5000)NSTAT,WORD2
062 CXM = MCX
C
C COMPUTE THE TIME AT WHICH THE NEXT CX ARRAY ENTRIES ARE TO BE MADE
C
DLTM = DLTM + CXM * .084946
TSTM = TSTM + DLTM
065 IF (7 - ZBER) 068, 068, 067
067 ZAFR = Z
068 GO TO (070, 070, 100), MWYA
070 RETURN
C
C COMPLETE OUTPUT CX TABLE
C
100 MCX = MCX - 1
IF (CX (1, MCX - 1) - CX (1, MCX)) 102, 100, 102
102 DO 104 MK = 2, MCX
C
CX (2, MK - 1) = CX (1, MK) - CX (1, MK - 1)
C
CX (4, MK - 1) = (CX (3, MK) - CX (3, MK - 1)) / CX (2, MK - 1)
CX (7, MK - 1) = (CX (4, MK) - CX (4, MK - 1)) / CX (2, MK - 1)
C
104 CX (9, MK - 1) = (CX (5, MK) - CX (5, MK - 1)) / CX (2, MK - 1)
DO 106 ML = 1, MCX
106 CX (1, ML) = CX (1, ML) + TME
GO TO 070
END

```

END OF COMPT, ATION: NO DIAGNOSTICS.

3: FURS C: 55A03A, 000000  
FOR 50F3-06/11/75-10:12:14 (.)

SUBROUTINE DBG ENTRY POINT 000114

STORAGE USED: CDEF(1) 000120; DATA(0) 000101; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SETI 002123  
0004 CLAP 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 NINDLE  
0006 NIO25  
0007 NIO15  
0010 NERR35

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000033	114KL	0001	000103	149L	0001	000072	156R	0000	000001	16F	0000	000007	17F
0001	000017	214KL	0000	000024	90F	0004	000000	ALT	0004	000404	ATP	0004	001010	80
0003	000000	CAY	0004	R 001011	CG	0004	001321	CHANGF	0004	R 001322	CWLP	0004	001323	CX
0004	003127	C2	0004	003130	C3	0004	003131	C6	0004	003132	DEK	0004	000001	DETIN
0003	000015	CIAM	0003	000326	DWEAN	0004	003133	DVID	0004	000327	DMS	0004	003147	DRM
0004	003150	D5	0004	003151	D5T	0004	003152	DSTO	0004	003153	DSTI	0004	003154	DST2
0004	003155	DT	0004	003156	DU	0004	003157	DWT	0004	003160	DY	0004	003161	DZ
0004	R 003162	ED	0004	R 003163	EK	0004	R 003164	EPS	0004	R 003165	FS	0004	003166	FTA
0003	000330	EXPO	0004	003572	F	0003	000331	FWASS	0004	0003573	FW	0004	003574	GRV
0003	001170	HFIHT	0004	R 004200	HL9	0004	004201	HOB	0004	I 000000	T	0004	000641	INDISTP
0003	000642	IFXEC	0000	000072	INUP\$	0004	004202	IPAM	0004	004203	IRAD	0004	000643	IRISF
0003	000644	ISIN	0003	I 000645	ISOUT	0004	004204	KCLD	0004	004205	KNT	0004	004206	KRX
0004	004207	K5	0004	004210	KSV	0004	004211	MCX	0004	004212	MMYA	0004	004213	N
0003	I 000646	NDSTR	0003	001172	NHODO	0004	004214	NNN	0004	004215	NPVA	0004	R 004216	P
0004	004217	PRS	0003	R 000647	PS	0004	R 004623	PW	0004	004624	QT	0004	R 004625	P
0004	004626	RA	0004	004627	RFD	0004	004628	RHZ	0004	005234	RL	0004	005235	RLH
0004	R 005641	RV	0004	R 005642	RZT	0004	R 005643	S	0004	005644	SAVE	0004	001157	SN
0004	005645	SLDTMP	0004	005646	SLM	0004	R 006252	SMALLT	0004	001160	SSAM	0004	006253	SZRO
0004	R 006254	T	0004	R 006255	TE	0003	001161	TME	0004	001162	TMP1	0004	001163	TMP2
0004	006256	TMSO	0003	001164	T2M	0004	R 006257	U	0004	001165	USOIL	0004	R 006260	V
0003	001166	VPP	0003	001503	VX	0003	002013	VY	0004	006261	VZRO	0004	001167	W
0004	R 006262	WT	0004	R 006263	X	0004	006264	XE	0004	R 006265	Y	0004	R 006575	Z
0004	006576	ZAFR	0004	006577	ZBPSTZ	0004	006600	ZLMT	0004	001171	ZSCL	0004	001173	ZV

00101	1*	SUBROUTINE DBG	0001	DRG	001	000000
00103	2*	COMMON /SETI/	0002	DRG	002	000000
00103	3*	1CAY	0003	DRG	003	000000
00103	4*	2FWASS(200), IDISTR	0004	DRG	004	000000
00103	5*	3NDSTR	0005	DRG	005	000000



3120R'S CLASSIFICATION  
FOR 5013-00/11/70-1 11:31:23 (1,)

SUBROUTINE DCSN ENTRY POINT 000135

STORAGE USED: CODE(1) 000137; DATA(0) 000042; BLANK, COMMON(2) 000000

COMMON BLOCKS:

0003 SFT1 002123  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 VERR2\$  
0006 WNDU\$  
0007 NIO2\$  
0010 VERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000115	IL	0001	000025	1041L	0001	000105	13L	0001	000063	14L	0001	000052	151L		
0001	000050	1521	0001	000010	1531L	0001	000033	154L	0001	000074	20L	0001	000005	66F		
0000	000011	77F	0001	000126	8L	0000	000015	8AF	0004	000000	ALT	0004	000404	ATP		
0004	001010	30	0003	000000	CAY	0004	001011	C6	0004	R	001321	CHANGE	0004	001322	CWLP	
0004	001323	CX	0004	003127	C2	0004	003130	C3	0004	003131	C6	0004	003132	DEK		
0003	000001	DETID	0003	000015	DIAM	0003	000326	DMEAN	0004	003132	DNTD	0003	003137	DNS		
0004	003147	DMV	0004	003150	DS	0004	R	003151	DST	0004	003152	DST0	0004	003153	DST1	
0004	R	003154	DST2	0004	003155	DT	0004	003156	DU	0004	003157	DWT	0004	003160	DX	
0004	003161	D7	0004	003162	ED	0004	003163	EK	0004	003164	EPS	0004	R	003165	ES	
0004	003166	ETA	0003	000330	EXPO	0004	003172	F	0003	000331	FWASS	0004	003573	FW		
0004	003574	GRV	0003	001170	HEIGHT	0004	004200	HLR	0004	004201	HOB	0003	000641	INDISTP		
0003	000642	IFXFC	0000	000036	INJPS	0004	004202	IPAM	0004	004203	IPAD	0003	000643	IRISE		
0003	000644	ISIM	0003	I	000645	ISOUT	0004	004204	KCLD	0004	004205	KPI	0004	004206	KPX	
0004	004207	KS	0004	004210	KSV	0004	004211	MCX	0004	I	004212	MWYA	0004	I	004213	N
0003	000646	MDSTR	0003	001172	NH000	0004	004214	NNN	0004	004215	NPVA	0000	I	000003	NSTAT	
0004	004216	P	0004	004217	PRS	0004	000647	PS	0004	R	004623	PW	0004	004624	QI	
0004	R	004625	R	0004	004626	RA	0004	004627	RED	0004	004630	PH7	0004	005234	PL	
0004	005235	RLH	0004	005641	RM	0004	005642	RZT	0004	005643	S	0004	005644	SAVE		
0003	001157	SD	0004	005645	SLDIMP	0004	005646	SLM	0004	R	006252	SMALLT	0003	001160	SSAM	
0004	006253	SZPO	0004	R	006254	T	0004	006255	TE	0003	001161	TWE	0003	001162	TWP1	
0003	001163	TP2	0004	006256	TMSD	0004	001164	T2M	0004	006257	U	0003	001165	USOIL		
0004	006260	V	0003	001166	VPR	0003	001503	VX	0003	002013	VY	0004	006261	VZPO		
0003	001167	W	0000	R	000004	WORD	0004	R	000000	WORD1	0000	R	000002	WORD4		
0004	006262	WT	0004	006263	X	0004	006264	XE	0004	006265	Y	0004	R	006575	Z	
0004	006576	ZAFR	0004	006577	ZBRSTZ	0004	R	006600	ZLMT	0003	001171	75CL	0003	001173	ZV	

00101	1*	SUBROUTINE DCSN	DCSN 001	000000
00103	2*	COMMON /SET1/	DCSN 002	000000
00103	3*	1CAY	DCSN 003	000000



00131	C	01*	101 IF (CVAL1 - CHANGE) 014, 015, 015	DCSN 061	000050
00132	C	02*	015 NST=20	DCSN 062	000051
00133	C	03*		DCSN 063	000052
00134	C	04*	TEST FOR ANOMALOUS CLOUD RISE AND SET UP TERMINATION CONDITION IF	DCSN 064	000053
00135	C	05*	ANOMALY IS FOUND	DCSN 065	000054
00136	C	06*		DCSN 066	000055
00137	C	07*	TEST FOR TEMPERATURE ANOMALY	DCSN 067	000056
00138	C	08*		DCSN 068	000057
00139	C	09*	014 IF (AS(T)-10.) 114, 20, 20	DCSN 069	000058
00140	C	10*	114 NSTAT=14	DCSN 070	000059
00141	C	11*	WORD=WORD1	DCSN 071	000060
00142	C	12*	GO TO 1	DCSN 072	000061
00143	C	13*		DCSN 073	000062
00144	C	14*	TEST FOR P.L.T.1 ANOMALY	DCSN 074	000063
00145	C	15*		DCSN 075	000064
00146	C	16*	020 IF (C-1.) 120, 13, 13	DCSN 076	000065
00147	C	17*	120 NSTAT=20	DCSN 077	000066
00148	C	18*	WORD=WORD4	DCSN 078	000067
00149	C	19*	GO TO 1	DCSN 079	000068
00150	C	20*	DELETE CARDS 95 THROUGH 91	DCSN 080	000069
00151	C	21*		DCSN 081	000070
00152	C	22*		DCSN 082	000071
00153	C	23*		DCSN 083	000072
00154	C	24*		DCSN 084	000073
00155	C	25*		DCSN 085	000074
00156	C	26*		DCSN 086	000075
00157	C	27*		DCSN 087	000076
00158	C	28*		DCSN 088	000077
00159	C	29*		DCSN 089	000078
00160	C	30*	TEST FOR ZLVT ANOMALY	DCSN 090	000079
00161	C	31*		DCSN 091	000080
00162	C	32*	013 IF (Z - ZLVT) 008, 008, 113	DCSN 092	000081
00163	C	33*	113 NSTAT=13	DCSN 093	000082
00164	C	34*	WORD=WORD3	DCSN 094	000083
00165	C	35*		DCSN 095	000084
00166	C	36*	001 MWYA = 3	DCSN 096	000085
			008 WRITE(15OUT, 99) NSTAT, WORD	DCSN 097	000086
			008 RETURN	DCSN 098	000087
			END	DCSN 099	000088
				DCSN 100	000089
				DCSN 101	000090

COMPLETE CY TABLE

END OF COMPIATION: NO DIAGNOSTICS.

3:FOR'S CASSANDRA.DEP1.R  
FOR S0E3-06/11/76-10:13:44 (1.)

SUBROUTINE DEPRV ENTRY POINT 001051

STORAGE USED: CODE(1) 001057; DATA(0) 000123; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SET1 00223  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 TRPL  
0006 XPRR  
0007 EXP  
0010 SORT  
0011 NERR2\$  
0012 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000436	100L	0001	000527	101L	0001	000543	103L	0001	000545	104L	0001	000264	1101L																																																																																											
0001	000266	1102L	0001	000340	1104L	0001	000416	1105L	0001	000767	1110L	0001	000075	16L																																																																																											
0001	000115	17L	0001	000212	380L	0001	000174	381L	0001	000200	3812L	0001	000724	555L																																																																																											
0001	000741	621L	0001	001036	901L	0004	R	000000	ALT	0004	R	000844	ATP																																																																																												
0003	000000	CAY	0004	001011	C6	0004	001321	CHANGF		0000	R	000027	CL	0004	R	001010	RD																																																																																								
0000	R	000002	CP	0000	R	000003	CPAI		0000	R	000005	CR	0000	R	001323	CX	0004	R	001392	CMLR																																																																																					
0004	R	003127	C2	0004	R	003130	C3	0004	R	003131	C6	0004	R	000001	DETRD	0004	R	003147	DRM	0004	R	003147	DRM																																																																																		
0003	000015	DIAM	0003	000326	DMFAN	0004	R	003151	DST	0004	R	003152	DSTO	0004	R	003153	DST1	0004	R	003153	DST1	0004	R	003153	DST1																																																																																
0000	R	000025	DRWF	0004	R	003150	DS	0004	R	003156	DU	0004	R	003157	DWT	0004	R	003160	DX	0004	R	003160	DX	0004	R	003160	DX																																																																														
0004	003154	DST2	0004	R	003155	DT	0004	R	003162	ED	0004	R	003163	EK	0004	R	003164	EPS	0004	R	003164	EPS	0004	R	003164	EPS																																																																															
0004	R	003161	D7	0004	R	003166	ETA	0004	R	003170	HEIGHT	0004	R	003172	HN	0004	R	003172	HN	0004	R	003172	HN	0004	R	003172	HN																																																																														
0004	003165	ES	0004	R	003174	GRV	0003	001170	HEIGHT	0003	001170	HEIGHT	0004	R	004201	H0R	0004	R	004201	H0R	0004	R	004201	H0R	0004	R	004201	H0R																																																																													
0004	003573	FW	0004	R	003574	GRV	0003	001170	HEIGHT	0003	001170	HEIGHT	0004	R	004201	H0R	0004	R	004201	H0R	0004	R	004201	H0R	0004	R	004201	H0R																																																																													
0003	000641	INISTR	0003	000642	IEXEC	0003	000642	IEXEC	0003	000642	IEXEC	0003	000642	IEXEC	0003	000642	IEXEC	0003	000642	IEXEC	0003	000642	IEXEC	0003	000642	IEXEC	0003	000642	IEXEC																																																																												
0003	000643	IRISE	0003	000644	ISIN	0003	000644	ISIN	0003	000644	ISIN	0003	000644	ISIN	0003	000644	ISIN	0003	000644	ISIN	0003	000644	ISIN	0003	000644	ISIN	0003	000644	ISIN																																																																												
0004	004206	KRX	0004	I	004207	KS	0004	I	004207	KS	0004	I	004207	KS	0004	I	004207	KS	0004	I	004207	KS	0004	I	004207	KS	0004	I	004207	KS																																																																											
0004	I	004213	N	0003	000646	NDSTR	0003	000646	NDSTR	0003	000646	NDSTR	0003	000646	NDSTR	0003	000646	NDSTR	0003	000646	NDSTR	0003	000646	NDSTR	0003	000646	NDSTR	0003	000646	NDSTR																																																																											
0000	R	000040	OMU	0004	R	004216	P	0004	R	004216	P	0004	R	004216	P	0004	R	004216	P	0004	R	004216	P	0004	R	004216	P	0004	R	004216	P																																																																										
0000	R	004624	QT	0000	R	000014	Q0	0000	R	000014	Q0	0000	R	000014	Q0	0000	R	000014	Q0	0000	R	000014	Q0	0000	R	000014	Q0	0000	R	000014	Q0																																																																										
0000	R	000026	Q1	0000	R	000030	Q2	0000	R	000030	Q2	0000	R	000030	Q2	0000	R	000030	Q2	0000	R	000030	Q2	0000	R	000030	Q2	0000	R	000030	Q2																																																																										
0000	R	000034	Q6	0000	R	000013	Q7	0000	R	000013	Q7	0000	R	000013	Q7	0000	R	000013	Q7	0000	R	000013	Q7	0000	R	000013	Q7	0000	R	000013	Q7																																																																										
0004	R	004626	RA	0004	R	004627	REFD	0004	R	004627	REFD	0004	R	004627	REFD	0004	R	004627	REFD	0004	R	004627	REFD	0004	R	004627	REFD	0004	R	004627	REFD																																																																										
0004	R	005641	RM	0000	R	000004	RVTX	0000	R	000004	RVTX	0000	R	000004	RVTX	0000	R	000004	RVTX	0000	R	000004	RVTX	0000	R	000004	RVTX	0000	R	000004	RVTX																																																																										
0004	005644	SAVE	0003	001157	SD	0003	001157	SD	0003	001157	SD	0003	001157	SD	0003	001157	SD	0003	001157	SD	0003	001157	SD	0003	001157	SD	0003	001157	SD	0003	001157	SD																																																																									
0003	001160	SCAM	0000	R	000012	SV	0000	R	000012	SV	0000	R	000012	SV	0000	R	000012	SV	0000	R	000012	SV	0000	R	000012	SV	0000	R	000012	SV	0000	R	000012	SV																																																																							
0004	R	006255	TE	0003	001164	TMF	0003	001164	TMF	0003	001164	TMF	0003	001164	TMF	0003	001164	TMF	0003	001164	TMF	0003	001164	TMF	0003	001164	TMF	0003	001164	TMF	0003	001164	TMF																																																																								
0003	R	000001	TPR	0000	R	000015	V5	0000	R	000015	V5	0000	R	000015	V5	0000	R	000015	V5	0000	R	000015	V5	0000	R	000015	V5	0000	R	000015	V5	0000	R	000015	V5																																																																						
0003	R	001166	VPR	0000	R	000023	VYR	0000	R	000023	VYR	0000	R	000023	VYR	0000	R	000023	VYR	0000	R	000023	VYR	0000	R	000023	VYR	0000	R	000023	VYR	0000	R	000023	VYR																																																																						
0003	R	002013	VY	0004	R	006263	X	0004	R	006263	X	0004	R	006263	X	0004	R	006263	X	0004	R	006263	X	0004	R	006263	X	0004	R	006263	X	0004	R	006263	X																																																																						
0004	R	006262	WT	0004	R	006262	WT	0004	R	006262	WT	0004	R	006262	WT	0004	R	006262	WT	0004	R	006262	WT	0004	R	006262	WT	0004	R	006262	WT	0004	R	006262	WT																																																																						
0001	000075	16L	0001	000724	555L	0004	R	001010	RD	0004	R	001392	CMLR	0004	R	000001	DETRD	0004	R	003147	DRM	0004	R	003153	DST1	0004	R	003160	DX	0004	R	003164	EPS	0004	R	003172	HN	0004	R	004201	H0R	0004	R	004203	IRAD	0004	R	004205	KDI	0004	R	004212	MWYA	0004	R	004215	NPVA	0004	R	004623	PW	0000	R	000007	QXE	0000	R	000033	Q5	0004	R	004625	PLH	0004	R	005215	PLH	0004	R	005643	S	0004	R	006252	SMALLT	0000	R	000000	TAD	0004	R	006256	TMSD	0004	R	006260	VXT	0004	R	006261	W	0004	R	006265	Y



000126	52*	CPAI=TAD*945.6*(TPR-TE)+0.09R55*(TPR**2-TE**2)	DERIV052	000126
000126	53*	COMPUTE SPECIFIC HEAT OF IN-CLOUD AIR-WATER-SOIL MIXTURE	DERIV053	000126
000126	54*		DERIV054	000126
000126	55*		DERIV055	000126
000127	56*	RMIX=(1.+X)/(1.+X+S*WT)	DERIV056	000141
000130	57*	CR=CR*RMIX	DERIV057	000147
000131	58*	IF(TMP2-T)3A0,3A1,3A1	DERIV058	000151
000131	59*	IF(T-R48.)3A10,3A10,3A11	DERIV059	000155
000137	60*	CPAI=7*1.6+0.5612*T-1.0R1E7/T**2	DERIV060	000161
000140	61*	GO TO 3R12	DERIV061	000179
000141	62*	3R11 CS=1003.8+0.13510*T	DERIV062	000174
000142	63*	3R12 CR=CQ+CS*(S+WT)/(1.+X+S*WT)	DERIV063	000200
000143	64*	OXE=(1.+XE)/(1.+29.*XE/1R.)	DERIV064	000212
000144	65*	QX=(1.+29.*X/1R.)/(1.+X)	DERIV065	000221
000145	66*	QTE=T/TE	DERIV066	000231
000145	67*	COMPUTE HORIZONTAL RADIUS OF CLOUD	DERIV067	000231
000145	68*		DERIV068	000231
000145	69*	R=SQRT(3.*V/(RZT*12.5663706E0))	DERIV069	000231
000146	70*		DERIV070	000234
000146	71*	IS CLOUD CENTER ALTITUDE GREATER OR LESS THAN ALTITUDE OF PREVIOUS DERIV071	DERIV071	000234
000146	72*	TIME STEP	DERIV072	000234
000146	73*	GFATER= TO 1101	DERIV073	000234
000146	74*	LESS = TO 1100	DERIV074	000234
000146	75*		DERIV075	000234
000147	76*	IF(K5.GT.0)GO TO 1102	DERIV076	000244
000151	77*	IF(2-ZBFR)1100,1101,1101	DERIV077	000251
000154	78*	DZ=0.	DERIV078	000254
000155	79*	U=0.	DERIV079	000257
000156	80*	DU=0.	DERIV080	000257
000157	81*	NNN=2	DERIV081	000260
000160	82*	GO TO 1102	DERIV082	000262
000161	83*	NNN=1	DERIV083	000264
000161	84*		DERIV084	000264
000161	85*	COMPUTE CLOUD S TO VOLUME RATIO	DERIV085	000264
000161	86*		DERIV086	000264
000162	87*	SV=12.5663706*R**2/V	DERIV087	000264
000162	88*	COMPUTE TURBULENT KINETIC ENERGY DISSIPATION RATE	DERIV088	000264
000162	89*		DERIV089	000266
000162	90*	EPS=C3*(2.*EK)**1.5/RZT	DERIV090	000266
000163	91*	Q7=AMAX1(ABS(U),SORT(2.*EK))	DERIV091	000272
000164	92*	Q8=Q7*QX*QXE*(1.+X*WT)/(1.+X+c*WT)	DERIV092	000304
000165	93*	IF(NHOD0)1103,1103,1104	DERIV093	000314
000166	94*	V5=0.0	DERIV094	000332
000171	95*	GO TO 1105	DERIV095	000334
000172	96*		DERIV096	000336
000172	97*	COMPUTE WIND SHEAR CORRECTION FACTOR	DERIV097	000336
000172	98*		DERIV098	000336
000172	99*		DERIV099	000336
000173	100*	ZTP=Z+RZT	DERIV100	000340
000174	101*	ZAT=Z-RZT	DERIV101	000342
000175	102*	CALL TRPL(ZTP,NHOD0,ZV,VX,VXT)	DERIV102	000342
000176	103*	CALL TRPL(ZTP,NHOD0,ZV,VY,VYT)	DERIV103	000354
000177	104*	CALL TRPL(ZBT,NHOD0,ZV,VX,VXR)	DERIV104	000364
000200	105*	CALL TRPL(ZBT,NHOD0,ZV,VY,VYR)	DERIV105	000372
000201	106*	V5=SQRT((VXT-VXR)**2 + (VYT-VYR)**2)	DERIV106	000401
000202	107*	RS=SV*Q7+1.5*C6*V5/R	DERIV107	000412
000203	108*	GO TO (100,101,100),N	DERIV108	000424

00203	10*	C	DERIV109	000425
00204	11*	C	DERIV110	000425
00205	11*	C	DERIV111	000425
00206	11*	C	DERIV112	000425
00207	11*	C	DERIV113	000425
00208	11*	C	DERIV114	000425
00209	11*	C	DERIV115	000434
00210	11*	C	DERIV116	000434
00211	11*	C	DERIV117	000474
00212	11*	C	DERIV118	000474
00213	11*	C	DERIV119	000474
00214	11*	C	DERIV120	000474
00215	11*	C	DERIV121	000474
00216	11*	C	DERIV122	000477
00217	11*	C	DERIV123	000477
00218	11*	C	DERIV124	000477
00219	11*	C	DERIV125	000477
00220	11*	C	DERIV126	000501
00221	11*	C	DERIV127	000501
00222	11*	C	DERIV128	000501
00223	11*	C	DERIV129	000501
00224	11*	C	DERIV130	000514
00225	11*	C	DERIV131	000524
00226	11*	C	DERIV132	000524
00227	11*	C	DERIV133	000524
00228	11*	C	DERIV134	000524
00229	11*	C	DERIV135	000524
00230	11*	C	DERIV136	000524
00231	11*	C	DERIV137	000524
00232	11*	C	DERIV138	000524
00233	11*	C	DERIV139	000524
00234	11*	C	DERIV140	000524
00235	11*	C	DERIV141	000534
00236	11*	C	DERIV142	000534
00237	11*	C	DERIV143	000544
00238	11*	C	DERIV144	000544
00239	11*	C	DERIV145	000544
00240	11*	C	DERIV146	000544
00241	11*	C	DERIV147	000544
00242	11*	C	DERIV148	000544
00243	11*	C	DERIV149	000544
00244	11*	C	DERIV150	000574
00245	11*	C	DERIV151	000574
00246	11*	C	DERIV152	000574
00247	11*	C	DERIV153	000574
00248	11*	C	DERIV154	000574
00249	11*	C	DERIV155	000604
00250	11*	C	DERIV156	000604
00251	11*	C	DERIV157	000634
00252	11*	C	DERIV158	000634
00253	11*	C	DERIV159	000634
00254	11*	C	DERIV160	000634
00255	11*	C	DERIV161	000634
00256	11*	C	DERIV162	000644
00257	11*	C	DERIV163	000644
00258	11*	C	DERIV164	000644
00259	11*	C	DERIV165	000644

00235	166*	DT=((-OX*OT*0.4*Q.8*U/CP*OXE-0.6*DRME/(RMIX*RM))+EPS/CP)*0.9	DERIV166	000642
00235	167*	COMPUTE TIME DERIVATIVE OF WATER VAPOR MIXING RATIO	DERIV167	000642
00235	168*		DERIV168	000642
00235	169*	DX=0.1*(0.3*OT+0.8*Y*U/(287.*TE)*OXE)	DERIV169	000642
00236	170*		DERIV170	000664
00236	171*	COMPUTE TIME DERIVATIVE OF LIQUID WATER MIXING RATIO	DERIV171	000664
00236	172*		DERIV172	000664
00236	173*		DERIV173	000664
00237	174*	DWTE=-(1.+X+S*WT)/RM*((WT+X-YF)/(1.+XE)*DRME+WT*CMLR/(S+WT))-DX	DERIV174	000676
00237	175*		DERIV175	000676
00240	176*	555 ENL=2.*C2*0.7*Q0/RZT	DERIV176	000720
00241	177*	GO TO (621,1110),NNN	DERIV177	000731
00242	178*	621 OMU=1.-RL	DERIV178	000741
00242	179*		DERIV179	000741
00242	180*	COMPUTE CLOUD VERTICAL ACCELERATION	DERIV180	000741
00242	181*		DERIV181	000741
00243	182*	DIU=(0.8/OMU*(OT*OX*OXE*RMIX-1.)-(OMI*ED1 +DRM/RM)*U)*RM/(RM+0.1)	DERIV182	000741
00243	183*	COMPUTE EDDY VISCOUS RATE OF LOSS OF KINETIC ENERGY OF RISE	DERIV183	000741
00243	184*		DERIV184	000741
00244	185*	.110 ED=ED1*U**2	DERIV185	000767
00244	186*	COMPUTE TIME DERIVATIVE OF TURBULENT KINETIC ENERGY DENSITY	DERIV186	000767
00244	187*		DERIV187	000767
00245	188*	DEKEED=(EK-0.5*U**2)*DRME/RM-EPS	DERIV188	000774
00245	189*		DERIV189	000774
00245	190*	COMPUTE TIME DERIVATIVE OF SOIL MIXING RATIO	DERIV190	000774
00245	191*		DERIV191	000774
00246	192*	DS=-(1.+X+S*WT)*S/RM*(CMLR/(S+WT)+DRME/(1.+XE))	DERIV192	001004
00246	193*		DERIV193	001004
00246	194*	COMPUTE IN-CLOUD GAS DENSITY	DERIV194	001004
00246	195*		DERIV195	001004
00247	196*	RA=RM/V*RMIX	DERIV196	001020
00250	197*	IF(EPS)902,902,901	DERIV197	001030
00253	198*	902 EPS=1.0E-4	DERIV198	001034
00254	199*	901 RETURN	DERIV199	001034
00255	200*	END	DERIV200	001056

END OF COMPI.ATION: NO DIAGNOSTICS.

3:FOR:5 OF:5A:1RA:OSTH:R  
FOR 50E3-0:11/76-1:13:51 (,,)

SUBROUTINE DCIRN EDIT: POINT 000662

STORAGE USED: 000611 000672: DATA(0) 000134: BLAN, COMMON(2) 000000

COMMON BLOCKS:

0003 SET1 002323

EXTERNAL REFERENCES (BLOCK, NAME)

0004 NERR2\$  
0005 ALOC  
0006 SORT  
0007 EXP  
0010 NRDU\$  
0011 NIO1\$  
0012 NIO2\$  
0013 ALOC10  
0014 XPRR  
0015 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000013	100L	0001	000046	102L	0001	000270	107L	0001	000022	112L	0001	000072	134G
0001	000106	142G	0001	000263	163G	0001	000275	170G	0001	000322	200L	0001	000073	2001F
0001	000421	201L	0001	000427	204L	0001	000453	2050L	0001	000373	216G	0001	000515	2056L
0001	000544	2057L	0001	000570	2060L	0001	000354	210G	0001	000614	306G	0001	000441	240G
0001	000474	252G	0001	000522	262G	0001	000633	300L	0001	000071	AJ	0001	000626	313G
0001	000637	321G	0001	000645	400L	0000	R	000000	0000	R	000067	AN	0000	000067
0000	R	000012	R	0000	R	000052	BAPWU	0000	R	000000	CAY	0000	R	000051
0003	000001	9FTTD	0003	R	000015	DIAM	0003	R	000326	DMEAN	0000	R	000327	DNS
0003	R	000330	EXP0	0003	R	000331	FMAS5	0000	R	000054	FRAC	0000	I	000057
0003	I	000641	IOISTR	0003	000642	IEEXEC	0000	I	000065	IJ	0000	000117	INJPS	0003
0003	I	000644	ISIN	0003	000645	ISOUT	0000	I	000062	IWAY	0000	I	000064	KSEG
0000	I	000050	L7	0000	I	000055	ND	0003	I	000646	NDSTR	0000	I	000172
0000	I	000063	NSEG	0000	R	000066	P0W	0000	R	000060	PRB	0003	R	001157
0000	R	000053	STGMA	0003	001160	SSAW	0003	001161	TME	0003	001162	TMP1	0003	001163
0003	001164	T2W	0003	001165	USOIL	0003	001166	VPR	0003	001503	VX	0003	002013	VY
0003	001167	W	0000	R	000024	Y	0000	R	000072	YJ	0003	001171	7SCL	0003

00101	1*	SUBROUTINE DCIRN	00101	DCIRN001	000000
00103	2*	COMMON /SET1/	00103	DCIRN002	000000
00103	3*	1CAY ,DETIR(12)	00103	DCIRN003	000000
00103	4*	2FMAS5(200),IOISTR	00103	DCIRN004	000000
00103	5*	3NDSTR ,PS(200)	00103	DCIRN005	000000
00103	6*	4TMP2 ,T2W	00103	DCIRN006	000000
00103	7*	5ZSCL ,NH000	00103	DCIRN007	000000

```

00104      R*
00104      G*
00104      10*
00104      11*
00104      12*
00104      13*
00104      14*
00104      15*
00104      16*
00105      17*
00106      18*
00106      19*
00107      20*
00110      21*
00111      22*
00114      23*
00115      24*
00116      25*
00121      26*
00122      27*
00123      28*
00124      29*
00125      30*
00126      31*
00127      32*
00130      33*
00131      34*
00132      35*
00133      36*
00136      37*
00140      38*
00141      39*
00144      40*
00145      41*
00146      42*
00147      43*
00147      44*
00147      45*
00147      46*
00147      47*
00151      48*
00152      49*
00153      50*
00154      51*
00155      52*
00155      53*
00155      54*
00155      55*
00156      56*
00157      57*
00162      58*
00165      59*
00167      60*
00172      61*
00173      62*
00175      63*
00176      64*

DIMENSION A(10),R(10),Y(10),R-LOW(10)
C
C LOGNORMAL DISTRIBUTION TO 100
C POWER FUNCTION DISTRIBUTION TO 200
C TABULAR DISTRIBUTION TO 300
C
C EQUATION 26-2.2% OF NRS-AWS 55 HANDBOOK IS USED TO COMPUTE THE
C PROBABILITY FUNCTION ARGUMENT FROM THE RATIONAL POLYNOMIAL
C APPROXIMATION TO THE NORMAL PROBABILITY FUNCTION.
C
C TA(X)=TA(X)-(2.515517+0.802853*TA(X)+0.010328*TA(X)**2)/
C 1(1.0+1.432788*TA(X)+0.189269*TA(X)**2+0.001308*TA(X)**3)
C
C LD=N*NDSTR+1
C GO TO (100,200,300),IDISTR
C
C 100 IF(D-MEAN)111,111,112
C 111 DMEAN=0.407
C SD=4.0
C 112 IF(NDSTR-1)101,101,102
C 101 PS(1)=DMEAN*1.0F-6
C CS=SD**5
C DIAM(1)=DMEAN/CS
C DIAM(2)=DMEAN*CS
C FMASS(1)=1.0
C GO TO 400
C
C 102 BARMU=ALOG(DMEAN)
C SIGMA=ALOG(SD)
C BARMU=BARMU*3.*SIGMA**2
C FRAC=1.0/FLOAT(NDSTR)
C DO 103 ND=1,NDSTR
C 103 FMASC(ND)=FRAC
C NH=NDSTR/2
C DO 104 I=1,NH
C PRB=FLOAT(I)*FRAC
C DIAM(I+1)=BARMU+APX(PRB)*SIGMA
C J=NDSTR-I+1
C 104 DIAM(J)=BARMU-APX(PRB)*SIGMA
C
C FOR THE 2 EXTREME INTERVALS THE AVERAGE DIAMETER IS
C ASSUMED TO BE AT HALF A MASS FRACTION FROM ZERO AND ONE
C
C PRB=FRAC/2.0
C PS(1)=BARMU+APX(PRB)*SIGMA
C PS(NDSTR)=BARMU-APX(PRB)*SIGMA
C DIAM(1)=2.*PS(1)-DIAM(2)
C DIAM(LD)=2.*PS(NDSTR)-DIAM(NDSTR)
C
C CALCULATE MEAN DIAMETERS FROM BOUNDARY VALUES
C
C J=NDSTR-1
C IF(J-1)107,107,105
C 105 DO 106 I=2,J
C 106 PS(I)=0.5*(DIAM(I)+DIAM(I+1))
C 107 DO 108 I=1,NDSTR
C DIAM(I)=EXP(DIAM(I))
C 108 PS(I)=EXP(PS(I))*1.0E-6
C DIAM(LD)=EXP(DIAM(LD))
C GO TO 400

```

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DSTBN008
DSTBN009
DSTBN010
DSTBN011
DSTBN012
DSTBN090
DSTBN091
DSTBN092
DSTBN
DSTBN096
DSTBN013
DSTBN014
DSTBN015
DSTBN016
DSTBN017
DSTBN018
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DSTBN043
DSTBN044
DSTBN045
DSTBN046
DSTBN047
DSTBN048
DSTBN049
DSTBN050
DSTBN051
DSTBN052
DSTBN053
DSTBN054
DSTBN055
DSTBN056
DSTBN057

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00177 000177 200 IWAY=1
00200 000200 IF(CAY*CT, 0.0 ) GO TO 201
00202 000202 CAY=RS(CAY)
00203 000203 CAY=CAY+0.5
00204 000204 IWAY=0
00205 000205 NSEG=FIX(CAY)
00206 000206 READ(ISTN,2001) (A(I),Y(I),I=1,NSEG)
00215 000215 2001 FORMAT( 2E10.4 )
00216 000216 KSEG=1
00217 000217 NSEG=NSEG-1
00220 000220 DO 2002 IJ=1, NSEG
00223 000223 3(IJ)=ALOG10(Y(IJ)/Y(IJ+1))/ALOG10(A(IJ)/A(IJ+1))
00224 000224 3(LA(IJ))=A(IJ+1)
00225 000225 2002 CONTINUE
00227 000227 3(LA(NSEG))=0.0
00230 000230 POW=1.0/3(KSEG)
00231 000231 201 IF(NSTR-1)203,204,204
00234 000234 203 NSTR=10
00235 000235 204 AN=FLOAT(NSTR)
00236 000236 FRAC=1.0/AN
00237 000237 DO 205 IJ=1, NSTR
00242 000242 EVASC(I)=FRAC
00244 000244 GO TO (2050+205*I), IWAY
00245 000245 2050 CONTINUE
00246 000246 POW=1.0/EXP0
00247 000247 DMN=(FRAC/CAY)**POW
00250 000250 DMN=DMN/1.0E+6
00251 000251 202 206 IJ=1, NSTR
00254 000254 AJ=FLOAT(IJ)-1.0
00255 000255 DIAM(IJ)=(AN-AJ)**POW*DMN
00257 000257 GO TO 2060
00260 000260 2055 CONTINUE
00261 000261 DO 2058 IJ=1, NSTR
00264 000264 YJ=100.0-FRAC*FLOAT(IJ-1) *100.0
00265 000265 GO TO 2057
00266 000266 2056 CONTINUE
00267 000267 KSEG=KSEG+1
00270 000270 POW=1.0/3(KSEG)
00271 000271 2057 CONTINUE
00272 000272 DIAM(IJ)=A(KSEG+1)*(YJ/Y(KSEG+1))**POW
00273 000273 IF(DIAM(IJ) .LT. ROLW(KSEG) ) GO TO 2056
00275 000275 DIAM(IJ)=DIAM(IJ)/1.0E+6
00276 000276 2058 CONTINUE
00300 000300 DMN=DIAM(NSTR)
00301 000301 2060 CONTINUE
00302 000302 PS(NSTR)=DMN*0.5**POW
00303 000303 DIAM(LD)=PS(NSTR)**2/DIAM(NSTR)
00304 000304 ND=NSTR-1
00305 000305 DO 207 IJ=1, ND
00310 000310 207 PS(IJ)=SORT(DIAM(IJ)*DIAM(IJ+1))
00312 000312 DO 208 IJ=1, LD
00315 000315 208 DIAM(IJ)=1.0E+6*DIAM(IJ)
00317 000317 GO TO 400
00320 000320 300 DO 301 I=1, NSTR
00323 000323 301 PS(I)=0.5*(DIAM(I)+DIAM(I+1))*1.0E-6
00325 000325 400 RETURN
00326 000326 END

```

3:FOR.S CASSANDRA.DVY.P  
FOR 50E3-06/11/76-10:13:55 (1)

SUBROUTINE DIVY ENTRY POINT 000307

STORAGE USED: CODE(1) 000337; DATA(0) 000051; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 RSTWFR 002123  
0004 PSTWFR 000074

EXTERNAL REFERENCES (BLOCK, NAME)

0005 NFRR2\$  
0006 NFRR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000035	10L	0001	000101	1206	0001	000235	1746	0001	00,200	200L	0001	000124	30L
0001	000136	35L	0001	000170	50L	0001	000175	55L	0003	R	000000	ALTHL	0003	R
0000	L	000000	CORSFT	0000	R	000011	DELA	0000	R	000007	I	0000	I	000013
0000	I	000001	LAM	0003	I	002052	LAMHLD	0000	I	000003	LCOR	0004	R	000012
0004	R	000036	PSTRHO	0004	R	000024	PSTSA	0004	R	000050	PSTX	0004	R	000703
0000	R	000006	RMOH	0000	R	000010	R12	0003	R	001730	TOPCOR	0000	R	000005

00101	1*	SUBROUTINE DIVY(NLAMNA,KTIM,IKLOUD,RMASS,NPSTW,NHODO)	000014
00103	2*	COMMON/BSTWFR/ ALTHLD(11,41),RADHLD(11,41),BOTCOR(2,41),	000014
00103	3*	1 TOPCOR(2,41),LAMHLD(41)	000014
00104	4*	1 COMMON/PSTWFR/ PSTALT(10),PSTRAD(10),PSTSA(10),PSTRHO(10)	000014
00104	5*	1 LOGICAL CORSFT, PSTX(10), PSTY(10)	000014
00105	6*	CORSFT=NHODO.GT. 0	000014
00106	7*	LAM=NLAMNA-1	000014
00107	8*	GO TO ( 10,200),IKLOUD	000022
00110	9*	10 CONTINUE	000024
00111	10*	H=ALTHLD(NLAMNA,KTIM)-ALTHLD(1,KTIM)	000034
00112	11*	LCOR=LAMHLD(KTIM)+1	000034
00113	12*	XRATIO=(TOPCOR(1,KTIM)-BOTCOR(1,KTIM))/	000037
00114	13*	(ALTHLD(LCOR,KTIM)-ALTHLD(1,KTIM))	000042
00114	14*	YRATIO=(TOPCOR(2,KTIM)-BOTCOR(2,KTIM))/	000042
00115	15*	(ALTHLD(LCOR,KTIM)-ALTHLD(2,KTIM))	000053
00115	16*	1 RMOH=RMASS/H	000053
00116	17*	DO 50 I=1,LAM	000061
00117	18*		000101
00117	19*		000101
00117	20*		000101
00122	21*	R12=RADHLD(1,KTIM)*RADHLD(I+1,KTIM)	000101
00123	22*	PSTR40(I)=RMOH/R12	000104
00123	23*		000104
00124	24*	PSTRAD(1)=R12	000107

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00124 28* C CALCULATE ALTITUDE AND SEMI ALTITUDE OF WAFER
00125 29* PSTSA(I)=(ALHLD(I)+KTIW)-ALHLD(I,KTIW))/2.0
00126 30* PSTALT(I)=ALHLD(I,KTIW)+PSTSA(I)
00127 31* C CALCULATE X AND Y COORDINATES
00128 32* IFC (CORSET ) GO TO 30
00129 33* PSTX(I)=0.0
00130 34* PSTY(I)=0.0
00131 35* GO TO 35
00132 36* C CONTINUE
00133 37* DELA=PSTALT(I)-ALHLD(I,KTIW)
00134 38* PSTX(I)=BOICOR(1,KTIW)+VRATIO*DELA
00135 39* PSTY(I)=BOICOR(2,KTIW)+VRATIO*DELA
00136 40* IFC (I+1.LE. LAMHLD(KTIW) ) GO TO 50
00137 41* IFC (I.EQ. LAM ) GO TO 50
00138 42* NPST=I+1
00139 43* PSTRAD(NPSTW)=RADHLD(NLAMNA,KTIW)**2
00139 44* PSTSA(NPSTW)=(ALHLD(NLAMNA,KTIW)-ALHLD(LCOR,KTIW))/2.0
00140 45* PSTALT(NPSTW)=ALHLD(LCOR,KTIW)+PSTSA(NPSTW)
00141 46* PSTX(NPSTW)=BOICOR(1,KTIW)
00142 47* PSTY(NPSTW)=BOICOR(2,KTIW)
00143 48* GO TO 55
00144 49* C CONTINUE
00145 50* NPST=ELAW
00146 51* C CONTINUE
00147 52* RETURN
00148 53* C FIND OUT HOW MANY WAFERS WERE COMBINED
00149 54* NPST=EPS( LAMHLD(I))
00150 55* C CALCULATE HEIGHT FOR EACH WAFER AND SEMI-HEIGHT AND DENSITY
00151 56* PSTALT(I)=ALHLD(2,KTIW)-ALHLD(1,KTIW)
00152 57* PSTRAD(I)=RADHLD(1,KTIW)**2
00153 58* PSTRHQ(I)=RWASS/(PSTALT(I)*PSTRAD(I))
00154 59* H=PSTALT(I)/FLOAT(NPSTW)
00155 60* PSTSA(I)=H/2.0
00156 61* PSTALT(I)=ALHLD(1,KTIW)+PSTSA(I)
00157 62* PSTX(I)=BOICOR(1,KTIW)
00158 63* PSTY(I)=BOICOR(2,KTIW)
00159 64* C BOTTOM WAFER ESTABLISHED USE IT TO CALCULATE THE REST
00160 65* DO 300 I=2,NPSTW
00161 66* PSTSA(I)=PSTSA(1)
00162 67* PSTX(I)=PSTX(1)
00163 68* PSTY(I)=PSTY(1)
00164 69* PSTRAD(I)=PSTRAD(1)
00165 70* PSTRHQ(I)=PSTRHQ(1)
00166 71* PSTALT(I)=PSTALT(1)+H*FLOAT(I-1)
00167 72* C CONTINUE
00168 73* RETURN
00169 74* END

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END OF COMPIATION: NO DIAGNOSTICS.

49

SUBROUTINE HELI EJECTA POINT 000174

```
STORAGE USED: CASE(1) 000002: DATA(0) 000034: BLANK COMMON(2) 000000
```

COMMON LOCKS:

0003	CLOUD	00F601
0004	WAFER	000423

### EXTERNAL REFERENCES (BLOCK NAME)

0005	TRPL
0006	NERP2B
0007	ALOG10
0010	XPRR
0011	NERP3B

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000012	10L	0001	000052	100L	0001	000072	110L	0001	004120	150L	000141	155L			
0003	000000	ALT	0003	000404	ATP	0003	001010	B0	0000	000005	C0	000101	C6			
0003	001321	CHANGE	0003	001322	CMLP	0003	R	003132	CX	0003	003127	C2	000310	C3		
0003	003131	C6	0003	003132	DEK	0000	R	000001	DEF	0000	000006	DN	000313	DN		
0004	000135	DPX	0003	003147	DPW	0003	003150	DS	0003	003151	DST	000315	DST			
0003	003153	DST1	0003	003154	DST2	0003	003155	DT	0003	003156	DU	0003157	DWT			
0003	003160	DY	0003	003161	DZ	0003	003162	EA	0003	003163	EK	0003164	FPS			
0003	003165	F5	0003	R	003166	ETA	0003	003572	F	0004	000422	FR06	0003573	FW		
0003	003574	G2V	0003	004200	HLR	0003	004201	H0R	0000	000023	INJPF	0004202	IPAW			
0003	004203	IRAN	0003	004204	KCLD	0003	004205	K01	0004	I	000000	K0NF	0004206	K0X		
0003	004207	K5	0003	004210	K5V	0003	I	000001	KTWO	0004	000002	LT	0004211	MCX		
0003	004212	MYA	0003	004213	N	0003	004214	NNN	0003	I	004215	NPVA	0004216	P		
0003	004217	PA5	0003	004523	PW	0000	R	000007	Q	0003	004624	QI	0004625	P		
0003	004626	RA	0003	004627	REF	0003	R	000630	R4Z	0003	005234	RL	0005235	PLH		
0003	005641	R4	0003	005642	R2T	0003	R	005643	S	0003	005644	SAVE	0005645	SLDTPD		
0003	005646	SLV	0003	006252	SMALLT	0003	R	006253	S7R0	0003	006254	T	0006255	TF		
0003	006256	T750	0003	006257	U	0000	R	000000	UP	0003	006260	V	0006261	VEL0CF		
0003	000002	VIS	0004	R	000003	VISX	0000	R	000003	V0	0003	006261	V7R0	000004	R	
0003	006262	WT	0003	006263	X	0003	006264	XF	0003	006265	Y	0003	006575	Z	000003	R

```

1*      00101
2*      00101
3*      00103
4*      00103
5*      00103
6*      00103
7*      00103

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CG(000)      *CHARGE      *
C6            *DEX         *
NIN(12)       *           *
DST1          *           *
DXT2          *           *
DX            *FD        *
             *           *
*****
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00103  R*      5EK      'ES      'ETA(260)  'F      'FW      000002
00103  9*      6GRV(260)  'HLR      'IPAM      'IRAD      000002
00103  10*     7KDI      'KRX      'KSV      'MCX      'MCX      000002
00103  11*     8N      'NNN      'NPVA      'P      'PRS(260)  'PW      000002
00103  12*     9RT      'R      'RA      'RFO      'RHZ(260)  'RL      000002
00103  13*    1RLH(260)  'RM      'RZT      'S      'SAVE      'SLDTPM  000002
00103  14*    2SLM(260)  'V      'SMALLT  'T      'TE      'TMSD      000002
00103  15*    3U      'V      'SZRO      'WT      'X      'XE      000002
00103  16*    4Y(200)  'Z      'ZBFR      'ZBRSTZ  'ZLMT      000002
00103  17*    COMMON/MAFER/  000002
00104  18*    1 KONE,KTWO,LT,VISCX(90),DPX(2,90),VELOCE,FROG 000002
00104  19*    DIMENSION ALITUD(2) 000002
00105  20*    THIS SUBROUTINE CALCULATES VERTICAL TRAVEL OF WAFER TOP OR 000002
00105  21*    BOTTOM DURING ONE TIME STEP IN CX ARRAY. 000002
00105  22*    THE PARTICLE DIAMETER IS PSIZ. 000002
00105  23*    THE ORIGINAL LAMINA ALTITUDE IS ALITUD(KONE) 000002
00105  24*    THE FINAL LAMINA ALTITUDE IS ALITUD(KTWO) 000002
00105  25*    KEY=1 SPECIFIES BELOW CLOUD CALCULATION 000002
00105  26*    KEY=2 SPECIFIES ABOVE CLOUD CALCULATION 000002
00105  27*    GO TO (10,100),KEY 000002
00106  28*  000002
00106  29*  000002
00106  30*  000002
00107  31*  000002
00110  32*  10 UP=CX(6,LT)+(ALITUD(KONE)-CX(3,LT))*DPX(2,LT) 000012
00110  33*  CALL TRPL(ALITUD(KONE),NPVA,ALT,RHZ,DEN) 000024
00111  34*  CALL TRPL(ALITUD(KONE),NPVA,ALT,ETA,VIS) 000034
00111  35*  GO TO 110 000034
00112  36*  000050
00112  37*  000050
00113  38*  000052
00114  39*  000064
00115  40*  000067
00115  41*  000067
00115  42*  000067
00115  43*  000067
00116  44*  000072
00117  45*  000072
00120  46*  000074
00121  47*  000077
00122  48*  000102
00124  49*  000102
00125  50*  000116
00126  51*  000120
00127  52*  000120
00130  53*  000124
00131  54*  000141
00132  55*  000147
00133  56*  000151
00134  57*  000162
00135  58*  000201

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END OF COMPIATION: NO DIAGNOSTICS.

3:FOR:5 CASABLANCA.1000:R  
FOR 5043-06/11/76-10:14:24 (,,)

SUBROUTINE ICRO ENTRY POINT 000225

STORAGE USED: CODE(1) 000221; DATA(0) 000350; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SFT1 002323  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 ATMV  
0006 MARDUS  
0007 NIO35  
0010 NIO25  
0011 NWDUS  
0012 NIO15  
0013 NFR35

23

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000017	1000F	0000	000112	1100F	0000	000113	1200F	0000	00-114	13-0F	0000	000114	1400F								
0000	000221	1500F	0000	000244	1600F	0000	000263	1700F	0001	000206	2L-0F	0001	000173	221G								
0000	000322	998F	0000	000344	999F	0004	R	000000	ALT	0004	R	000404	ATP									
0004	001010	40	0004	000000	CAY	0004	001011	CG	0004	000000	ATID	0004	001322	CMLP								
0004	001323	CG	0004	00127	C2	0004	001330	C3	0004	001331	C6	0004	001332	DEK								
0003	000001	DEVID	0003	000015	DIAV	0003	000326	DMEAN	0004	R	003133	DNID	0004	000327	DNS							
0004	003147	DMV	0004	003150	DS	0004	003151	DST	0004	003152	DSTO	0004	003153	DSTI								
0004	003154	DST2	0004	003155	DT	0004	003156	DU	0004	003157	DWT	0004	003160	DX								
0004	003161	DZ	0004	003162	ED	0004	003163	EK	0004	003164	EPS	0004	003165	ES								
0004	R	003166	ETA	0003	000330	EXP0	0004	003572	F	0004	003573	FW	0004	003574	FW							
0004	R	003574	GV	0003	001170	HEIGHT	0004	004200	HLR	0004	004201	HOB	0004	000016	I							
0003	I	000641	INITSTR	0003	000642	IEXEC	0000	000351	INUP\$	0004	I	004202	TPAM	0004	I	004203	TPAN					
0003	000643	IRISE	0003	I	000644	ISTN	0003	I	000645	ISOLIT	0000	I	000014	KATM	0004	I	004204	KCLD				
0004	I	004205	KAT	0004	I	004206	KPX	0004	I	004207	KS	0004	R	004210	KSV	0004	R	004211	MCX			
0004	004212	MVA	0004	004213	N	0004	004214	N	0003	I	000646	NOSTR	0004	R	004217	PDS	0004	R	004218	NNN		
0004	I	004215	NPAVA	0004	004216	P	0004	004217	P	0004	R	004218	P	0004	R	004219	PS	0004	R	004220	PS	
0004	R	004630	R4Z	0004	004631	R	0004	004632	R	0004	R	004633	R	0004	R	004634	R	0004	R	004635	R	
0004	R	004635	SLV	0004	004636	S	0004	004637	S	0004	R	004638	S	0004	R	004639	S	0004	R	004640	S	
0004	R	004641	R4Z	0004	004642	R4Z	0004	004643	R4Z	0004	R	004644	R4Z	0004	R	004645	R4Z	0004	R	004646	R4Z	
0004	R	004646	SLV	0004	004647	SLV	0004	004648	SLV	0004	R	004649	SLV	0004	R	004650	SLV	0004	R	004651	SLV	
0004	R	004651	SLV	0004	004652	SLV	0004	004653	SLV	0004	R	004654	SLV	0004	R	004655	SLV	0004	R	004656	SLV	
0004	R	004656	SLV	0004	004657	SLV	0004	004658	SLV	0004	R	004659	SLV	0004	R	004660	SLV	0004	R	004661	SLV	
0004	R	004661	SLV	0004	004662	SLV	0004	004663	SLV	0004	R	004664	SLV	0004	R	004665	SLV	0004	R	004666	SLV	
0004	R	004666	SLV	0004	004667	SLV	0004	004668	SLV	0004	R	004669	SLV	0004	R	004670	SLV	0004	R	004671	SLV	
0004	R	004671	SLV	0004	004672	SLV	0004	004673	SLV	0004	R	004674	SLV	0004	R	004675	SLV	0004	R	004676	SLV	
0004	R	004676	SLV	0004	004677	SLV	0004	004678	SLV	0004	R	004679	SLV	0004	R	004680	SLV	0004	R	004681	SLV	
0004	R	004681	SLV	0004	004682	SLV	0004	004683	SLV	0004	R	004684	SLV	0004	R	004685	SLV	0004	R	004686	SLV	
0004	R	004686	SLV	0004	004687	SLV	0004	004688	SLV	0004	R	004689	SLV	0004	R	004690	SLV	0004	R	004691	SLV	
0004	R	004691	SLV	0004	004692	SLV	0004	004693	SLV	0004	R	004694	SLV	0004	R	004695	SLV	0004	R	004696	SLV	
0004	R	004696	SLV	0004	004697	SLV	0004	004698	SLV	0004	R	004699	SLV	0004	R	004700	SLV	0004	R	004701	SLV	
0004	R	004701	SLV	0004	004702	SLV	0004	004703	SLV	0004	R	004704	SLV	0004	R	004705	SLV	0004	R	004706	SLV	
0004	R	004706	SLV	0004	004707	SLV	0004	004708	SLV	0004	R	004709	SLV	0004	R	004710	SLV	0004	R	004711	SLV	
0004	R	004711	SLV	0004	004712	SLV	0004	004713	SLV	0004	R	004714	SLV	0004	R	004715	SLV	0004	R	004716	SLV	
0004	R	004716	SLV	0004	004717	SLV	0004	004718	SLV	0004	R	004719	SLV	0004	R	004720	SLV	0004	R	004721	SLV	
0004	R	004721	SLV	0004	004722	SLV	0004	004723	SLV	0004	R	004724	SLV	0004	R	004725	SLV	0004	R	004726	SLV	
0004	R	004726	SLV	0004	004727	SLV	0004	004728	SLV	0004	R	004729	SLV	0004	R	004730	SLV	0004	R	004731	SLV	
0004	R	004731	SLV	0004	004732	SLV	0004	004733	SLV	0004	R	004734	SLV	0004	R	004735	SLV	0004	R	004736	SLV	
0004	R	004736	SLV	0004	004737	SLV	0004	004738	SLV	0004	R	004739	SLV	0004	R	004740	SLV	0004	R	004741	SLV	
0004	R	004741	SLV	0004	004742	SLV	0004	004743	SLV	0004	R	004744	SLV	0004	R	004745	SLV	0004	R	004746	SLV	
0004	R	004746	SLV	0004	004747	SLV	0004	004748	SLV	0004	R	004749	SLV	0004	R	004750	SLV	0004	R	004751	SLV	
0004	R	004751	SLV	0004	004752	SLV	0004	004753	SLV	0004	R	004754	SLV	0004	R	004755	SLV	0004	R	004756	SLV	
0004	R	004756	SLV	0004	004757	SLV	0004	004758	SLV	0004	R	004759	SLV	0004	R	004760	SLV	0004	R	004761	SLV	
0004	R	004761	SLV	0004	004762	SLV	0004	004763	SLV	0004	R	004764	SLV	0004	R	004765	SLV	0004	R	004766	SLV	
0004	R	004766	SLV	0004	004767	SLV	0004	004768	SLV	0004	R	004769	SLV	0004	R	004770	SLV	0004	R	004771	SLV	
0004	R	004771	SLV	0004	004772	SLV	0004	004773	SLV	0004	R	004774	SLV	0004	R	004775	SLV	0004	R	004776	SLV	
0004	R	004776	SLV	0004	004777	SLV	0004	004778	SLV	0004	R	004779	SLV	0004	R	004780	SLV	0004	R	004781	SLV	
0004	R	004781	SLV	0004	004782	SLV	0004	004783	SLV	0004	R	004784	SLV	0004	R	004785	SLV	0004	R	004786	SLV	
0004	R	004786	SLV	0004	004787	SLV	0004	004788	SLV	0004	R	004789	SLV	0004	R	004790	SLV	0004	R	004791	SLV	
0004	R	004791	SLV	0004	004792	SLV	0004	004793	SLV	0004	R	004794	SLV	0004	R	004795	SLV	0004	R	004796	SLV	
0004	R	004796	SLV	0004	004797	SLV	0004	004798	SLV	0004	R	004799	SLV	0004	R	004800	SLV	0004	R	004801	SLV	
0004	R	004801	SLV	0004	004802	SLV	0004	004803	SLV	0004	R	004804	SLV	0004	R	004805	SLV	0004	R	004806	SLV	
0004	R	004806	SLV	0004	004807	SLV	0004	004808	SLV	0004	R	004809	SLV	0004	R	004810	SLV	0004	R	004811	SLV	
0004	R	004811	SLV	0004	004812	SLV	0004	004813	SLV	0004	R	004814	SLV	0004	R	004815	SLV	0004	R	004816	SLV	
0004	R	004816	SLV	0004	004817	SLV	0004	004818	SLV	0004	R	004819	SLV	0004	R	004820	SLV	0004	R	004821	SLV	
0004	R	004821	SLV	0004	004822	SLV	0004	004823	SLV	0004	R	004824	SLV	0004	R	004825	SLV	0004	R	004826	SLV	
0004	R	004826	SLV	0004	004827	SLV	0004	004828	SLV	0004	R	004829	SLV	0004	R	004830	SLV	0004	R	004831	SLV	
0004	R	004831	SLV	0004	004832	SLV	0004	004833	SLV	0004	R	004834	SLV	0004	R	004835	SLV	0004	R	004836	SLV	
0004	R	004836	SLV	0004	004837	SLV	0004	004838	SLV	0004	R	004839	SLV	0004	R	004840	SLV	0004	R	004841	SLV	
0004	R	004841	SLV	0004	004842	SLV	0004	004843	SLV	0004	R	004844	SLV	0004	R	004845	SLV	0004	R	004846	SLV	
0004	R	004846	SLV	0004	004847	SLV	0004	004848	SLV	0004	R	004849	SLV	0004	R	004850	SLV	0004	R	004851	SLV	
0004	R	004851	SLV	0004	004852	SLV	0004	004853	SLV	0004	R	004854	SLV	0004	R	004855	SLV	0004	R	004856	SLV	
0004	R	004856	SLV	0004	004857	SLV	0004	004858	SLV	0004	R	004859	SLV	0004	R	004860	SLV	0004	R	004861	SLV	
0004	R	004861	SLV	0004	004862	SLV	0004	004863	SLV	0004	R	004864	SLV	0004	R	004865	SLV	0004	R	004866	SLV	
0004	R	004866	SLV	0004	004867	SLV	0004	004868	SLV	0004	R	004869	SLV	0004	R	004870	SLV	0004	R	004871	SLV	
0004	R	004871	SLV	0004	004872	SLV	0004	004873	SLV	0004	R	004874	SLV	0004	R	004875	SLV	0004	R	004876	SLV	
0004	R	004876	SLV	0004	004877	SLV	0004	004878	SLV	0004	R	004879	SLV	0004	R	004880						





00154	115*	WRITE(ISOUT,1000)	ICRD 115	000067
00156	116*	WRITE(ISOUT,1400)DNID,ATID,ZBRSTZ,SLDTMP,DNS,W,FW,PHI	ICRD 116	000074
00170	117*	WRITE(ISOUT,1600)RPHI	ICRD 117	000116
00173	118*	WRITE(ISOUT,1500)NDSTR,IDISTR,KDI,IRAD,KCLD,KRX,IPAM,KATM	ICRD 118	000124
00205	119*	WRITE(ISOUT,1700)NDSTR,KDI,IRAD	ICRD 119	000141
00212	120*	IF(KATM)2,2,1	ICRD 120	000151
00215	121*	1 WRITE(ISOUT,998)	ICRD 121	000156
00217	122*	1 WRITE(ISOUT,999) (ALT(I),ATP(I),RHZ(I),ETA(I),PRS(I),GRV(I),SLM(I))	ICRD 122	000164
00217	123*	IRLH(1),I=1,NPVA)	ICRD 123	000164
00234	124*	2 KCLD = KCLD + 1	ICRD 124	000206
00235	125*	KRX = KRX + 1	ICRD 125	000210
00236	126*	RETURN	ICRD 126	000217
00237	127*	END	ICRD 127	000230

END OF COMPIATION: NO DIAGNOSTICS.

Q:FOR:5 CASSANDRA.LINK1.R  
FOR SOEX-06/11/76-10:14:28 (1,)

SUBROUTINE LINK1 ENTRY POINT 000605

STORAGE USED: CODE(1) 000613; DATA(0) 000731; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SET1 002323

EXTERNAL REFERENCES (BLOCK, NAME)

0004 TIME  
0005 TEMP  
0006 MASS  
0007 VAPOR  
0010 OSTBN  
0011 SHWIND  
0012 MRDUS  
0013 NIO3\$  
0014 NIO2\$  
0015 NWDUS  
0016 NERR2\$  
0017 NIO1\$  
0020 XPRR  
0021 NSTOPS  
0022 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000012 1F	0000	000145 10F	0001	000361 102L	0001	000447 106L	0000	00015 11F
0001	000471 116L	0001	000501 117L	0001	000506 118L	0000	000162 12F	0000	00020 13F
0000	000324 14F	0001	000514 143L	0000	000334 15F	0001	000522 150L	0000	000340 16F
0000	000435 17F	0001	000533 170L	0001	000527 171L	0000	000451 18F	0000	000507 19F
0001	000570 190L	0000	000535 191F	0000	000547 192F	0000	000555 193F	0000	000676 194F
0000	000702 195F	0000	000633 197F	0000	000613 2F	0001	000510 20L	0001	000541 200L
0001	000061 210L	0001	000130 211L	0001	000110 22L	0001	000113 220L	0001	000152 2276
0001	000171 23L	0000	000027 3F	0001	000325 302L	0001	000332 305L	0001	000342 309L
0001	000436 310L	0001	000367 311L	0001	000375 315L	0001	000406 346	0000	00001 4F
0001	000051 402L	0000	000061 5F	0000	000065 6F	0001	000217 66L	0000	000071 7F
0001	000223 70L	0000	000135 8F	0000	000141 9F	0001	000243 40L	0001	000244 92L
0001	000264 93L	0001	000270 95L	0003	000000 CAY	0003	000001 DETID	0003	000015 DIAW
0003	R 000326 DWEAN	0000	R 000010 DM1	0000	R 000011 DM2	0003	R 000327 DNS	0003	R 000330 EXP0
0003	R 000331 FWASS	0003	R 001170 HEIGHT	0000	R 000003 HEW	0000	I 000005 I	0003	I 000641 INISTR
0003	000642 IEXEC	0000	000720 INJPS	0003	000643 IRISE	0000	I 000004 IS	0003	I 000644 ISIN
0003	I 000645 ISOUT	0000	I 000001 J	0000	I 000007 JG	0000	I 000006 LD	0000	I 000002 N
0003	I 000646 NOSTR	0003	001172 NHODD	0000	I 000000 NN	0003	R 000647 PS	0003	R 001147 SD
0003	R 001160 SSAM	0003	R 001161 TME	0003	R 001162 TMP1	0003	R 001163 TMP2	0003	R 001164 T2M
0003	R 001165 USOIL	0003	R 001166 VPR	0003	R 001503 VX	0003	R 002013 VV	0003	R 001167 W
0003	R 001171 Z5CL	0003	001173 ZV						

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00101 1* SUBROUTINE LINK1 000000 LINK1001
00101 2* INITIAL CONDITIONS (FIREBALL) MODULE 000000 LINK1002
00101 3* ARCON CORPORATION 20 NOVEMBER 1969 000000 LINK1003
00101 4* 000000 LINK1004
00101 5* 000000 LINK1005
00101 6* 000000 LINK1006
00101 7* 000000 LINK1007
00101 8* 000000 LINK1008
00101 9* 000000 LINK1009
00101 10* 000000 LINK1010
00101 11* 000000 LINK1011
00101 12* 000000 LINK1012
00101 13* 000000 LINK1013
00101 14* 000000 LINK1014
00101 15* 000000 LINK1015
00101 16* 000000 LINK1016
00101 17* 000000 LINK1017
00101 18* 000000 LINK1018
00101 19* 000000 LINK1019
00101 20* 000000 LINK1020
00101 21* 000000 LINK1021
00101 22* 000000 LINK1022
00101 23* 000000 LINK1023
00101 24* 000000 LINK1024
00101 25* 000000 LINK1025
00101 26* 000000 LINK1026
00101 27* 000000 LINK1027
00101 28* 000000 LINK1028
00101 29* 000000 LINK1029
00101 30* 000000 LINK1030
00101 31* 000000 LINK1031
00101 32* 000000 LINK1032
00101 33* 000000 LINK1033
00101 34* 000000 LINK1034
00101 35* 000000 LINK1035
00101 36* 000000 LINK1036
00101 37* 000000 LINK1037
00101 38* 000000 LINK1038
00101 39* 000000 LINK1039
00101 40* 000000 LINK1040
00101 41* 000000 LINK1041
00101 42* 000000 LINK1042
00101 43* 000000 LINK1043
00101 44* 000000 LINK1044
00101 45* 000000 LINK1045
00101 46* 000000 LINK1046
00101 47* 000000 LINK1047
00101 48* 000000 LINK1048
00101 49* 000000 LINK1049
00101 50* 000000 LINK1050
00101 51* 000000 LINK1051
00101 52* 000000 LINK1052
00101 53* 000000 LINK1053
00101 54* 000000 LINK1054
00101 55* 000000 LINK1055
00101 56* 000000 LINK1056

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PROGRAM TO DETERMINE THE INITIAL CONDITIONS SPECIFICATIONS OF  
 TIME, TEMPERATURE, TOTAL SOIL MASS, FRACTION OF THE SOIL BURDEN IN  
 THE VAPOR PHASE, AND THE SIZE FREQUENCY DISTRIBUTION OF THE  
 CONDENSED PHASE SOIL

THE FIRST CARD CONTAINS ANY ARBITRARY ALPHANUMERIC IDENTIFICATION.  
 THE SECOND CARD OF THE DATA DECK CONTAINS THE NUMBER OF CASES TO  
 BE RUN, FORMAT (I5).  
 THIS PARAMETER SHOULD BE LEFT BLANK IF THE USER WISHES THE PROGRAM  
 TO CALL LINK2 AND SHOULD BE GIVEN SOME POSITIVE VALUE N IF  
 THE USER WISHES THE PROGRAM TO STOP AFTER COMPUTING N SPTS OF  
 INITIAL CONDITIONS.

OTHER INPUT PARAMETERS ARE - TEST PARAMETER (IDISTR) TO DETERMINE  
 IF THE PARTICLE SIZE FREQUENCY DISTRIBUTION IS LOG-NORMAL, POWER  
 LAW, OR TABULAR, YIELD IN KILOTONS, HEIGHT(DEPTH) OF BURST IN  
 METERS, A SOIL TYPE INDICATOR, FALLOUT PARTICLE DENSITY(GM/CM\*\*3),  
 MEAN(MICROMETERS) AND STANDARD DEVIATION FOR A LOG-NORMAL PARTICLE  
 SIZE FREQUENCY DISTRIBUTION, THE NUMBER OF PARTICLE SIZE CLASSES  
 IN THE PARTICLE SIZE FREQUENCY DISTRIBUTION, IF EITHER A TABULAR  
 OR POWER LAW DISTRIBUTION IS USED, THE MEAN AND STANDARD  
 DEVIATION ARE NOT CALLED FOR SINCE THEY DO NOT APPLY. IF A  
 LOG-NORMAL DISTRIBUTION IS TO BE SUPPLIED BY THE PROGRAM, THE  
 MEAN AND STANDARD DEVIATION FIELDS ARE LEFT BLANK.

FOR UNDERGROUND BURSTS INPUT DEPTH OF BURST AS A NEGATIVE NUMBER

THE OUTPUT UNITS ARE MASS IN KILOGRAMS, LENGTH IN METERS, TIME IN  
 SECONDS, TEMPERATURE IN DEGREES KELVIN, YIELD IN KILOTONS,  
 DISTRIBUTION PARAMETERS IN MICRONS

\*\*\*\*\* GLOSSARY \*\*\*\*\*  
 CAY COEFFICIENT OF THE FREQUENCY FUNCTION FOR THE POWER  
 LAW PARTICLE SIZE FREQUENCY DISTRIBUTION  
 DEYID(I) INITIAL CONDITIONS IDENTIFICATION ARRAY  
 DIAM(I) ARRAY(201), UPPER BOUNDARY OF THE I-TH PARTICLE SIZE  
 CLASS. THE LAST ENTRY IN THE DIAM ARRAY IS THE LOWER  
 BOUNDARY OF THE LAST(SMALLEST) PARTICLE SIZE CLASS.  
 THE LENGTH OF THE DIAM ARRAY IS ALWAYS ONE GREATER  
 THAN THE NUMBER OF SIZE CLASSES(MICROMETERS)  
 DMEAN MEDIAN DIAMETER (MICROMETERS) OF LOGNORMAL PARTICLE  
 SIZE DISTRIBUTION  
 DNS FALLOUT PARTICLE DENSITY (GM/CM\*\*3)  
 EXPO EXPONENT OF THE FREQUENCY FUNCTION FOR THE POWER  
 LAW PARTICLE SIZE FREQUENCY DISTRIBUTION  
 HEIGHT HEIGHT OF BURST (METERS) ABOVE GROUND ZERO  
 IDISTR CONTROL INTEGER FOR PARTICLE SIZE DISTRIBUTION  
 1 - LOGNORMAL DISTRIBUTION  
 2 - POWER LAW DISTRIBUTION



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00110 114* 5 FORMAT(1H+,65X,9H$ILICEOUS) LINK114 00000
00111 115* 6 FORMAT(1H+,65X,10H$CALCAREOUS) LINK115 00000
00112 116* 7 FORMAT(//20X50H$PRE-SHOT SOIL PARTICLE SIZE FREQUENCY DISTRIBUTION/LINK116 00000
00113 117* 125X32HA LOG-NORMAL DISTRIBUTION WITH -/30X,4H$MEAN,31X,E12.5,2X,11H$LINK117 00000
00114 118* 2MICROMETERS/30X,18H$STANDARD DEVIATION,17X,E12.5 /25X,34H$LINK118 00000
00115 119* 3S DISTRIBUTION WAS SPECIFIED BY) LINK119 00000
00116 120* 8 FORMAT(1H+,65X,11H$THE PROGRAM) LINK120 00000
00117 121* 9 FORMAT(1H+,65X,8H$THE USER) LINK121 00000
00118 122* 10 FORMAT(15) LINK122 00000
00119 123* 11 FORMAT(//3X,58H$THE SCALED DEPTH OF BURST IS BEYOND THE SCOPE OF THE LINK123 00000
00120 124* 1 MODEL//) LINK124 00000
00121 125* 12 FORMAT(//3X,111H$THE SCALED HEIGHT OF BURST IS SUCH THAT THERE IS NO LINK125 00000
00122 126* 1 SOIL MASS ENTRAINED IN THE CLOUD AND HENCE NO LOCAL FALLOUT//) LINK126 00000
00123 127* 13 FORMAT(//25X37H$*** INITIAL CLOUD PROPERTIES AT H +E12.5,14H$SECLINK127 00000
00124 128* 10NDS ****//20X,23H$AVERAGE GAS TEMPERATURE38X,E12.5,2X,14H$DEGREES LINK128 00000
00125 129* 2KELVIN/20X,56H$AVERAGE TEMPERATURE OF CONDENSED PHASE MATERIAL IN LINK129 00000
00126 130* 3CLOUD,5X,E12.5,2X,14H$DEGREES KELVIN//20X,31H$MASS OF VAPORIZED SOIL LINK130 00000
00127 131* 4 IN CLOUD,30X,E12.5,2X,9H$KILOGRAMS//20X,41H$MASS OF CONDENSED PHASE LINK131 00000
00128 132* 5 MATERIAL IN CLOUD,20X,E12.5,2X,9H$KILOGRAMS//20X,84H$PARTICLE SIZE FLINK132 00000
00129 133* 6 FREQUENCY DISTRIBUTION AT THE TIME OF INITIAL CONDITIONS SPECIFICAT LINK133 00000
00130 134* 7 ION) LINK134 00000
00131 135* 14 FORMAT(1H1//51X,14H$*** DATA SET I2,6H ****//) LINK135 00000
00132 136* 15 FORMAT(1X,14H$LEAVING LINK 1) LINK136 00000
00133 137* 16 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK137 00000
00134 138* 17 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK138 00000
00135 139* 18 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK139 00000
00136 140* 19 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK140 00000
00137 141* 20 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK141 00000
00138 142* 21 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK142 00000
00139 143* 22 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK143 00000
00140 144* 23 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK144 00000
00141 145* 24 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK145 00000
00142 146* 25 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK146 00000
00143 147* 26 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK147 00000
00144 148* 27 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK148 00000
00145 149* 28 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK149 00000
00146 150* 29 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK150 00000
00147 151* 30 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK151 00000
00148 152* 31 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK152 00000
00149 153* 32 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK153 00000
00150 154* 33 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK154 00000
00151 155* 34 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK155 00000
00152 156* 35 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK156 00000
00153 157* 36 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK157 00000
00154 158* 37 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK158 00000
00155 159* 38 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK159 00000
00156 160* 39 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK160 00000
00157 161* 40 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK161 00000
00158 162* 41 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK162 00000
00159 163* 42 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK163 00000
00160 164* 43 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK164 00000
00161 165* 44 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK165 00000
00162 166* 45 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK166 00000
00163 167* 46 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK167 00000
00164 168* 47 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK168 00000
00165 169* 48 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK169 00000
00166 170* 49 FORMAT(1//51X,14H$*** DATA SET I2,6H ****//) LINK170 00000

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00136 171* C READ CONTROL INTEGER
00141 172* READ (ISIN,10)N
00141 173* C
00141 174* C WRITE OVERALL TITLE
00144 175* WRITE (ISOUT,16)(DETID(J),J=1,12)
00147 176* READ(ISIN,10)IDISTR
00152 177* READ(ISIN,10)NDISTR
00155 178* IF(NDISTR)401,401,402
00160 179* 401 NDSTR=100
00161 180* 402 GO TO (210,220,211),IDISTR
00162 181* 210 READ(ISIN,3) W=HEIGHT,USOIL,DMEAN,S,DNS,HEW
00173 182* IF(DNS .LE. 1.E-20) DNS=2.6
00173 183* C WAS A PRESHOT PARTICLE LOG-NORMAL DISTRIBUTION SPECIFIED BY
00173 184* C THE USER YES TO 22
00175 185* IF(DMEAN)21,21,22
00200 186* 21 IS=0
00201 187* GO TO 23
00202 188* 22 IS=1
00203 189* GO TO 23
00204 190* 220 READ(ISIN,3) W=HEIGHT,USOIL,EXPO,CAY,DNS,HEW
00215 191* GO TO 23
00216 192* 211 READ(ISIN,3) W=HEIGHT,USOIL,DNS,HEW
00225 193* READ(ISIN,195)(FMAS(I),DIAM(I),I=1,NDSTR)
00234 194* LD=NDSTR+1
00235 195* READ(ISIN,195)DIAM(LD)
00235 196* C
00235 197* C 23 CONVERT HOB - DOB FROM METERS TO FEET
00240 198* 23 HEIGHT=HEIGHT/0.3048
00241 199* C IF THIS IS H.E. SET W
00241 200* IF( HEW.GT. 0.0 ) W=HEW
00241 201* ZSCL IS THE SCALED HOB - DOB
00243 202* 60 ZSCL=HEIGHT/((W)*(1.0/3.4))
00243 203* C
00243 204* C TEST THE DATA TO SEE IF THE MODEL IS APPROPRIATE
00244 205* IF(HEIGHT)66,66,63
00247 206* 63 IF(ZSCL-180.0)70,70,150
00252 207* 66 IF(ZSCL+20.0)143,70,70
00255 208* 70 CALL TIME
00256 209* CALL TEMP
00257 210* CALL MASS
00260 211* CALL VAPOR
00261 212* GO TO (90,95,95),IDISTR
00261 213* C
00261 214* C TEST FOR ACCEPTABLE SPECIFICATIONS OF PRE-SHOT PARTICLE SIZE
00261 215* C FREQUENCY DISTRIBUTION.
00262 216* 90 IF(SD)91,92,92
00265 217* 91 WRITE (ISOUT,2)
00267 218* GO TO 93
00270 219* 92 IF(DMEAN)94,95,95
00273 220* 94 WRITE (ISOUT,17)
00273 221* C 93 SHOULD THE RUN BE HALTED. YES TO 190
00275 222* 93 IF(N)190,190,170
00275 223* C
00300 224* 95 CALL D57BN
00300 225* C
00300 226* C CONVERT HOB - DOB BACK TO METERS FROM FEET
00301 227* HEIGHT=HEIGHT*0.3048

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LINK1171
LINK1172
LINK1173
LINK1174
LINK1175
LINK1176
LINK1177
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LINK1190
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LINK1198
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000226
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000264
000264
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000270
000271

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Q:FOR.S CASSANDRA.LINK2.R  
FOR 50E3-06/11/76-10:14:34 (1.)

SUBROUTINE LINK2 ENTRY POINT 000074

STORAGE USED: CODE(1) 000100: DATA(0) 000307: BLANK, COMMON(2) 000000

COMMON BLOCKS:

0003 SET1 002323  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 ICRD  
0006 CRM  
0007 TRPL  
0010 RXP  
0011 NWDU  
0012 NIOZ  
0013 NERR3

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STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000030	1226	0001	000022	SL	0000	000266	513F	0004	00000	ALT	0004	00040	ATP
0004	001010	B0	0003	000000	CAY	0004	001011	C6	0004	00132	CHANGF	0004	00132	CMLR
0004	R 001323	CX	0000	R 000000	CXTIM	0000	R 000132	CXTMP	0004	003127	C2	0004	003130	C3
0004	003131	C6	0003	R 000327	DEK	0004	000001	DEWID	0003	000015	DIAM	0003	000326	DMEAN
0004	003133	DND	0003	R 000327	DNS	0004	003147	DRM	0004	003150	OS	0004	003151	DST
0004	003152	DST0	0004	003153	DST1	0004	003154	DST2	0004	003155	DT	0004	003156	DU
0004	003157	DWT	0004	003160	DX	0004	003161	DZ	0004	003162	ED	0004	003163	EK
0004	003164	EPS	0004	003165	ES	0004	003166	ETA	0003	000330	EXPO	0004	003572	F
0003	R 000331	FMASS	0004	003573	FW	0004	003574	GRV	0003	R 001170	HEIGHT	0004	004200	HLR
0004	004201	HOB	0003	000641	IDISTR	0003	000642	IEXEC	0000	000301	INJPS	0004	004202	IPAM
0004	004203	IRAD	0003	000643	IRISE	0003	000644	ISIN	0003	I 000645	ISOUT	0004	004204	KCLD
0004	004205	KDI	0004	004206	KRX	0004	004207	KS	0004	004210	KSV	0000	000244	MA
0000	I 000265	MR	0004	I 004211	MCX	0004	004212	MWYA	0004	004213	N	0003	000646	NDSTR
0003	001172	NH000	0004	004214	NNN	0004	004215	NPVA	0004	004216	P	0004	004217	PRS
0003	000647	PS	0004	004623	PW	0004	004624	QT	0004	004625	R	0004	004626	RA
0004	R 004627	REF	0004	004630	RHZ	0004	005234	RL	0004	005235	RLH	0004	005641	RM
0004	005642	R2T	0004	005643	S	0004	005644	SAVE	0003	001157	SD	0004	005645	SLOTMP
0004	005646	SLM	0004	006252	SMALLT	0003	R 001160	SSAM	0004	006253	SZRO	0004	006254	T
0004	006255	TE	0003	001161	TME	0003	001162	TMP1	0003	001163	TMP2	0004	006256	TMSD
0003	001164	T2A	0004	006257	U	0003	001165	USOIL	0004	006260	V	0003	001166	VPR
0003	001503	VX	0003	002013	VY	0004	006261	VZRO	0003	R 001167	W	0004	006262	WT
0004	006263	X	0004	006264	XE	0004	006265	Y	0004	006575	Z	0004	006576	ZBFR
0004	006577	ZARSTZ	0004	006600	ZLMT	0003	001171	ZSCL	0003	001173	ZV			

00101 1\* SUBROUTINE LINK2 000000  
00101 2\* C 000000

00101	3*	C	ALT	-	ARRAY(260), ATMOSPHERE ALTITUDE IN METERS(MSL) CORRESPONDING	LINK2003	00000n
00101	4*	C		-	TO ATP, ETA, GRV, PRS, RHZ, RLH, SLM	LINK2004	00000n
00101	5*	C	AP	-	ARRAY(8), TEMPORARY STORAGE USED IN ATM	LINK2005	00000n
00101	6*	C	AREAX	-	MAXIMUM PROJECTED AREA ON THE GROUND BELOW STABILIZED CLOUD	LINK2006	00000n
00101	7*	C	ATMR	-	SUBROUTINE, READS IN TABLES OF ALT,ATP,ETA,PRS,RH,RLH,GRV,	LINK2007	00000n
00101	8*	C		-	SLM	LINK2008	00000n
00101	9*	C	ATID	-	ARRAY(12), 72 ALPHANUMERIC CHARACTERS FOR	LINK2009	00000n
00101	10*	C		-	ATMOSPHERE IDENTIFICATION	LINK2010	00000n
00101	11*	C	ATP	-	ARRAY(260), ATMOSPHERE TEMPERATURE (K) MATCHES ALT	LINK2011	00000n
00101	12*	C	RARM(1)	-	MEDIAN DIAMETER OF THE LOGNORMAL PARTICLE SIZE VS. MASS	LINK2012	00000n
00101	13*	C		-	DISTRIBUTION	LINK2013	00000n
00101	14*	C	RZ	-	DEPOSIT INCREMENT LINEAR DIMENSION(CX(5,MCX)/TRAD)	LINK2014	00000n
00101	15*	C	R0	-	PARAMETER USED TO DETERMINE CLOUD VERTICAL RADIUS	LINK2015	00000n
00101	16*	C	CG	-	ARRAY(200), FALLING SPEEDS OF PARTICLES IN THE CLOUD	LINK2016	00000n
00101	17*	C		-	(M/SEC)	LINK2017	00000n
00101	18*	C	CHANGE	-	CLOUD TIME AFTER WHICH STEP LENGTH CHANGES TO DST2	LINK2018	00000n
00101	19*	C	CL	-	LATENT HEAT OF VAPORIZATION OF WATER	LINK2019	00000n
00101	20*	C	CMLR	-	CLOUD MASS LOSS RATE OF PARTICULATE FALLOUT	LINK2020	00000n
00101	21*	C	CP	-	SPECIFIC HEAT OF AIR	LINK2021	00000n
00101	22*	C	CPAI	-	SPECIFIC HEAT OF AIR INTEGRATED FROM TE TO T	LINK2022	00000n
00101	23*	C	CPFR	-	SUBROUTINE, COMPUTES PARTICLE FALLOUT RATE DURING CLOUD	LINK2023	00000n
00101	24*	C		-	RISE CALCULATIONS	LINK2024	00000n
00101	25*	C	CPV	-	SUBROUTINE, COMPUTES INITIAL CRM VARIABLES	LINK2025	00000n
00101	26*	C	CR	-	WEIGHTED AVERAGE SPECIFIC HEAT FOR AIR AND SOIL	LINK2026	00000n
00101	27*	C	CRM	-	SUBROUTINE, COMPUTES CLOUD RISE AND EXPANSION VARIABLES	LINK2027	00000n
00101	28*	C	CRMW	-	SUBROUTINE, PRINTS CRM OUTPUT	LINK2028	00000n
00101	29*	C	CRX	-	ARRAY(10,90), CLOUD DIMENSIONS VS. TIME	LINK2029	00000n
00101	30*	C		-	(1,J) - TIME(SEC) AFTER BURST	LINK2030	00000n
00101	31*	C		-	(2,J) - CLOUD TIME INTERVAL(SEC) BEGINNING AT CX(1,J)	LINK2031	00000n
00101	32*	C		-	(3,J) - CLOUD BASE(M) AT CX(1,J)	LINK2032	00000n
00101	33*	C		-	(4,J) - CLOUD TOP(M) AT CX(1,J)	LINK2033	00000n
00101	34*	C		-	(5,J) - CLOUD RADIUS(M) AT CX(1,J)	LINK2034	00000n
00101	35*	C		-	(6,J) - CLOUD BASE RATE (M/SEC) DURING CX(2,J)	LINK2035	00000n
00101	36*	C		-	(7,J) - CLOUD TOP RATE (M/SEC) DURING CX(2,J)	LINK2036	00000n
00101	37*	C		-	(8,J) - CLOUD RADIAL RATE(M/SEC) DURING CX(2,J)	LINK2037	00000n
00101	38*	C		-	(9,J) - CLOUD TEMPERATURE (K) AT CX(1,J)	LINK2038	00000n
00101	39*	C		-	(10,J) - IN-CLOUD GAS DENSITY (KG/M**3) AT CX(1,J)	LINK2039	00000n
00101	40*	C	CXPN	-	SUBROUTINE, TABULATES CX ARRAY	LINK2040	00000n
00101	41*	C	C2	-	CONSTANT USED IN EDDY VISCOSITY MOMENTUM GENERATION	LINK2041	00000n
00101	42*	C		-	(YIELD DEPENDENT)	LINK2042	00000n
00101	43*	C	C3	-	CONSTANT USED IN COMPUTING TURBULENT ENERGY DISSIPATION RATE	LINK2043	00000n
00101	44*	C	C6	-	CONSTANT USED IN COMPUTING AIR ENTRAINMENT RATE INTO CLOUD	LINK2044	00000n
00101	45*	C		-	CAUSED BY WIND SHEAR	LINK2045	00000n
00101	46*	C	DEK	-	DERIVATIVE OF EK	LINK2046	00000n
00101	47*	C	DENT	-	DATA STATEMENT USED FOR IDENTIFICATION OF IRISE TAPE	LINK2047	00000n
00101	48*	C	DERIV	-	SUBROUTINE, EVALUATES DERIVATIVES OF CLOUD RISE VARIABLES	LINK2048	00000n
00101	49*	C	DETID	-	ARRAY(12), 72 ALPHANUMERIC DETONATION IDENTIFICATION CARD	LINK2049	00000n
00101	50*	C	DIAM	-	ARRAY(201), UPPER BOUNDARY OF I-TH PARTICLE SIZE CLASS.	LINK2050	00000n
00101	51*	C		-	THE LAST ENTRY IN THE ARRAY IS THE LOWER BOUNDARY OF THE	LINK2051	00000n
00101	52*	C		-	LAST(SMALLEST) PARTICLE SIZE CLASS. THE LENGTH OF THE DIA	LINK2052	00000n
00101	53*	C		-	ARRAY IS ALWAYS ONE GREATER THAN THE NUMBER OF SIZE CLASSES.	LINK2053	00000n
00101	54*	C	DNID	-	ARRAY(12), 72 ALPHANUMERIC RUN IDENTIFICATION	LINK2054	00000n
00101	55*	C	DNS	-	FALLOUT PARTICLE DENSITY (GM/CM**3)	LINK2055	00000n
00101	56*	C		-	IF NOT PUNCHED, DNS = 2.6	LINK2056	00000n
00101	57*	C	DPST	-	ARRAY(8,2), DEPOSIT INCREMENT VARIABLES COMPILED IN	LINK2057	00000n
00101	58*	C		-	SUBROUTINE REXP, THE SECOND INDEX IS NEEDED ONLY IN THE REXP	LINK2058	00000n
00101	59*	C		-	CALCULATIONS TO DISTINGUISH THE INCREMENT TOP FROM THE	LINK2059	00000n

00101	60*	C	INCREMNT BOTTOM.	LINK2060	000000
00101	61*	C	(1,MBT) - TIME (SEC) OF ALTITUDE STABILIZATION OR GROUNDING	LINK2061	000000
00101	62*	C	(2,MBT) - ALTITUDE OF INCREMENT CENTER OF MASS (METERS)	LINK2062	000000
00101	63*	C	(3,MBT) - INCREMENT RADIUS AT CENTER OF MASS (METERS)	LINK2063	000000
00101	64*	C	(4,MBT) - MEAN PARTICLE DIAMETER (MICROMETERS)	LINK2064	000000
00101	65*	C	(5,MBT) - INCREMENT MASS (KGM.)	LINK2065	000000
00101	66*	C	(6,MBT) - INCREMENT VERTICAL THICKNESS (METERS)	LINK2066	000000
00101	67*	C	(7,MBT) - ALTITUDE OF INCREMENT BOTTOM (METERS)	LINK2067	000000
00101	68*	C	(8,MBT) - INCREMENT VOLUME (CUBIC METERS)	LINK2068	000000
00101	69*	C	- NUMBER OF DEPOSIT INCREMENTS PER PARTICLE SIZE CLASS	LINK2069	000000
00101	70*	C	- ARRAY(2,90), DEPOSIT INCREMENT RISE AND EXPANSION VARIABLE	LINK2070	000000
00101	71*	C	(1,J) - LIFT RATE FACTOR ABOVE CLOUD BASE (1/SEC)	LINK2071	000000
00101	72*	C	(2,J) - LIFT RATE FACTOR BELOW CLOUD BASE (1/SEC)	LINK2072	000000
00101	73*	C	- DERIVATIVE OF RM	LINK2073	000000
00101	74*	C	- DERIVATIVE OF S	LINK2074	000000
00101	75*	C	- INTEGRATION TIME STEP	LINK2075	000000
00101	76*	C	- INITIAL INTEGRATION TIME STEP	LINK2076	000000
00101	77*	C	- INTERMEDIATE INTEGRATION TIME STEP	LINK2077	000000
00101	78*	C	- FINAL VALUE OF INTEGRATION TIME STEP	LINK2078	000000
00101	79*	C	- DERIVATIVE OF T	LINK2079	000000
00101	80*	C	- DERIVATIVE OF U	LINK2080	000000
00101	81*	C	- ARRAY(8), USED TO TRANSMIT VARIABLE DERIVATIVES	LINK2081	000000
00101	82*	C	- DERIVATIVE OF WT	LINK2082	000000
00101	83*	C	- DERIVATIVE OF X	LINK2083	000000
00101	84*	C	- DERIVATIVE OF Z	LINK2084	000000
00101	85*	C	- EDDY VISCOSITY LOSS RATE OF KINETIC ENERGY OF RISE	LINK2085	000000
00101	86*	C	- TURBULENT KINETIC ENERGY DENSITY	LINK2086	000000
00101	87*	C	- KINETIC ENERGY LOSS RATE	LINK2087	000000
00101	88*	C	- SUBROUTINE, FOR GENERAL UTILITY INDICATION	LINK2088	000000
00101	89*	C	- SATURATION PRESSURE OF WATER VAPOR (INVALID FOR TEMPERATURE	LINK2089	000000
00101	90*	C	ABOVE BOILING POINT OF WATER)	LINK2090	000000
00101	91*	C	- ARRAY(260), ATMOSPHERIC DYNAMIC VISCOSITY (=COEFF. OF VISC.)	LINK2091	000000
00101	92*	C	(KGM/(M-SEC)) MATCHES ALT ARRAY	LINK2092	000000
00101	93*	C	- IN SUBROUTINE REXP, TIME INCREMENT BETWEEN WAFER HISTORY	LINK2093	000000
00101	94*	C	DESCRIPTION POINTS	LINK2094	000000
00101	95*	C	- FRACTION OF W IN FIREBALL AT START OF RISE	LINK2095	000000
00101	96*	C	- ARRAY(200), PARTICLE SIZE CLASS FRACTION OF TOTAL MASS LIFTED	LINK2096	000000
00101	97*	C	- OBJECT TIME FORMAT USED TO READ ATMOSPHERE TABLES	LINK2097	000000
00101	98*	C	- CONSTANT USED IN COMPUTING PARTICLE FALL RATES	LINK2098	000000
00101	99*	C	- FISSION YIELD IN KILOTONS	LINK2099	000000
00101	100*	C	- ARRAY(10,100), DEPOSIT INCREMENT VARIABLES (OUTPUT OF REXP)	LINK2100	000000
00101	101*	C	(1,J) - DEPOSIT INCREMENT X COORDINATE (METERS)	LINK2101	000000
00101	102*	C	(2,J) - DEPOSIT INCREMENT Y COORDINATE (METERS)	LINK2102	000000
00101	103*	C	(3,J) - TIME COORDINATE (SEC)	LINK2103	000000
00101	104*	C	(4,J) - PARTICLE DIAMETER (METERS)	LINK2104	000000
00101	105*	C	(5,J) - DEPOSIT INCREMENT MASS (KGM)	LINK2105	000000
00101	106*	C	(6,J) - Z COORDINATE OF INCREMENT CENTER OF MASS (METERS)	LINK2106	000000
00101	107*	C	(7,J) - INCREMENT RADIUS AT CENTER OF MASS (METERS)	LINK2107	000000
00101	108*	C	(8,J) - INCREMENT VERTICAL THICKNESS (METERS)	LINK2108	000000
00101	109*	C	(9,J) - ALTITUDE OF INCREMENT BOTTOM (METERS)	LINK2109	000000
00101	110*	C	(10,J) - INCREMENT VOLUME (CUBIC METERS)	LINK2110	000000
00101	111*	C	- ARRAY(260), ACCELERATION DUE TO GRAVITY (CM/SEC**2)	LINK2111	000000
00101	112*	C	- HEIGHT OF BURST (METERS) ABOVE GROUND ZERO	LINK2112	000000
00101	113*	C	- RELATIVE HUMIDITY AT ALTITUDE OF CLOUD CENTER	LINK2113	000000
00101	114*	C	- HEIGHT(FT) OF BURST ABOVE GROUND ZERO (ZBRSTZ)	LINK2114	000000
00101	115*	C	- SUBROUTINE, READS LINK2 INPUT CARDS	LINK2115	000000
00101	116*	C	- PARTICLE DISTRIBUTION CONTROL PARAMETER (SET IN LINK1)	LINK2116	000000

00101	117*	C	1 - LOGNORMAL DISTRIBUTION	LINK2117	00000n
00101	118*	C	2 - POWER LAW DISTRIBUTION	LINK2118	00000n
00101	119*	C	3 - TABULAR INPUT DISTRIBUTION	LINK2119	00000n
00101	120*	C	TEXC - CONTROL INTEGER FOR CALLING PROGRAM LINKS	LINK2120	00000n
00101	121*	C	IPAM - CONTROL INTEGER FOR PAM OPTION	LINK2121	00000n
00101	122*	C	0 - NO PAM CALL	LINK2122	00000n
00101	123*	C	1 - CALL PAM	LINK2123	00000n
00101	124*	C	IRAD - NUMBER OF CLOUD WAFER RADIUS SUBDIVISIONS (SEE B7)	LINK2124	00000n
00101	125*	C	IRISE - LOGICAL DESIGNATION FOR TAPE USED FOR TEMPORARY STORAGE IN	LINK2125	00000n
00101	126*	C	ATMR AND FOR RXP OUTPUT	LINK2126	00000n
00101	127*	C	JRASE - COMPUTED GO TO INDEX USED IN SUBROUTINE RXP	LINK2127	00000n
00101	128*	C	1 - CONTINUE DPST TRAJECTORY COMPUTATION	LINK2128	00000n
00101	129*	C	2 - DPST TRAJECTORY COMPUTATION COMPLETE	LINK2129	00000n
00101	130*	C	KATM - ATMOSPHERE PRINTOUT SWITCH	LINK2130	00000n
00101	131*	C	0 - NO ATMOSPHERE PRINTOUT	LINK2131	00000n
00101	132*	C	1 - ATMOSPHERE PRINTOUT	LINK2132	00000n
00101	133*	C	COMPUTED GO TO INDEX USED IN SUBROUTINE RXP	LINK2133	00000n
00101	134*	C	1 - ADJUST DPST RADIUS AND ACTIVITY FOR LEAVING CLOUD	LINK2134	00000n
00101	135*	C	2 - ADJUSTMENT OF 1 HAS BEEN MADE	LINK2135	00000n
00101	136*	C	KCLD - CONTROL INDEX FOR CRM DEBUG PRINTOUT,	LINK2136	00000n
00101	137*	C	0 - NO DEBUG PRINT OUT	LINK2137	00000n
00101	138*	C	1 - DEBUG PRINT OUT	LINK2138	00000n
00101	139*	C	KCX - NUMBER OF NPST RISE AND EXPANSION INTERVALS	LINK2139	00000n
00101	140*	C	KDI - NUMBER OF DEPOSIT INCREMENT PER PSC	LINK2140	00000n
00101	141*	C	IF NOT PUNCHED, IT IS COMPUTED BY PROGRAM	LINK2141	00000n
00101	142*	C	(SEE RXP)	LINK2142	00000n
00101	143*	C	KDIP - IN SUBROUTINE RXP, NUMBER OF SUBDIVISIONS OF A WAFER WHOSE	LINK2143	00000n
00101	144*	C	TOP AND BOTTOM RADII ARE NOT EQUAL	LINK2144	00000n
00101	145*	C	KDPST - SEE DPSTK	LINK2145	00000n
00101	146*	C	KRX - CONTROL INDEX FOR RXP DEBUG PRINTOUT	LINK2146	00000n
00101	147*	C	0 - NO DEBUG PRINTOUT	LINK2147	00000n
00101	148*	C	1 - DEBUG PRINTOUT	LINK2148	00000n
00101	149*	C	KSV - INDEX WHICH DETERMINES FUNCTION OF SUBROUTINE RSTR	LINK2149	00000n
00101	150*	C	1 - PRESERVE VARIABLES AT START OF TIME STEP	LINK2150	00000n
00101	151*	C	2 - RESTORE VARIABLES TO THOSE AT START OF TIME STEP	LINK2151	00000n
00101	152*	C	LODD - LENGTH OF PARTICLE DESCRIPTION DATA BLOCK (GDPST ARRAY IN	LINK2152	00000n
00101	153*	C	RXP)	LINK2153	00000n
00101	154*	C	MRT - IN SUBROUTINE RXP, DISTINGUISHES A WAFER TOP FROM A WAFER	LINK2154	00000n
00101	155*	C	BOTTOM	LINK2155	00000n
00101	156*	C	MBT=1 SPECIFIES A WAFER TOP	LINK2156	00000n
00101	157*	C	MBT=2 SPECIFIES A WAFER BOTTOM	LINK2157	00000n
00101	158*	C	MCX - NUMBER OF TIME POINTS (ROWS) OF CX ARRAY	LINK2158	00000n
00101	159*	C	MWYA - 1, INITIAL ENTRY INTO CXP	LINK2159	00000n
00101	160*	C	2, REGULAR ENTRY	LINK2160	00000n
00101	161*	C	3, FINAL ENTRY	LINK2161	00000n
00101	162*	C	N - CLOUD MODE SWITCH	LINK2162	00000n
00101	163*	C	NDSTR - NUMBER OF ENTRIES IN PARTICLE SIZE CLASS TABLE	LINK2163	00000n
00101	164*	C	NHODO - NUMBER OF ENTRIES IN THE WIND HODOGRAPH TABLE	LINK2164	00000n
00101	165*	C	NNN - TOTAL NUMBER OF EQUATIONS BEING INTEGRATED	LINK2165	00000n
00101	166*	C	NPVA - NUMBER OF ELEMENTS IN ALT AND CORRESPONDING ARRAYS	LINK2166	00000n
00101	167*	C	LIMITS OF NPVA = 1,260	LINK2167	00000n
00101	168*	C	THE MNEMONIC NPVA IS CHANGED TO NAT IN LINK 4	LINK2168	00000n
00101	169*	C	P - ATMOSPHERIC PRESSURE AT CLOUD CENTER ALTITUDE	LINK2169	00000n
00101	170*	C	PHI - FRACTION OF F*W USED TO HEAT AIR	LINK2170	00000n
00101	171*	C	PPST - ARRAY(B*10), TEMPORARY STORAGE OF DEPOSIT INCREMENT	LINK2171	00000n
00101	172*	C	VARIABLES IN RXP FOR WAFER SUBDIVISIONS	LINK2172	00000n
00101	173*	C	PRS - ARRAY(260) ATMOSPHERIC PRESSURE (MB) MATCHES ALT	LINK2173	00000n

00101	174*	C	PS	-	ARRAY(200), PARTICLE SIZE CLASS MIDPOINT DIAMETER (METERS)	LINK2174	00000n
00101	175*	C	PSIZE	-	PARTICLE SIZE CLASS MIDPOINT(MICROMETERS)USED IN SUBR. CPFR	LINK2175	00000n
00101	176*	C	PW	-	PARTIAL PRESSURE OF WATER VAPOR IN THE CLOUD	LINK2176	00000n
00101	177*	C	Q	-	CONVERSION FACTOR FOR FRACTION MASS TO NUMBER OF PARTICLES	LINK2177	00000n
00101	178*	C		-	PER M**3	LINK2178	00000n
00101	179*	C	QI	-	VIRTUAL MASS FACTOR TERM IN CLOUD EQUATION OF MOTION	LINK2179	00000n
00101	180*	C	QX	-	FACTOR CONVERTS CLOUD TEMPERATURE TO VIRTUAL CLOUD	LINK2180	00000n
00101	181*	C		-	TEMPERATURE	LINK2181	00000n
00101	182*	C	QXE	-	INVERSE OF FACTOR TO CONVERT AMBIENT TEMPERATURE TO	LINK2182	00000n
00101	183*	C		-	VIRTUAL AMBIENT TEMPERATURE	LINK2183	00000n
00101	184*	C	R	-	CLOUD HORIZONTAL RADIUS	LINK2184	00000n
00101	185*	C	RA	-	GAS DENSITY OF CLOUD	LINK2185	00000n
00101	186*	C	RADIUS	-	DEPOSIT INCREMENT RADIUS USED IN SUBROUTINE REXP	LINK2186	00000n
00101	187*	C	RFD	-	DENSITY OF EXTRA MATERIAL IN CLOUD(MKS)(EQUALS DNS*1000.)	LINK2187	00000n
00101	188*	C	RHZ	-	ARRAY(260) ATMOSPHERE AIR DENSITY (KG/M**3) MATCHES ALT.	LINK2188	00000n
00101	189*	C		-	THE MNEMONIC RHZ IS CHANGED TO RHO IN LINK 4.	LINK2189	00000n
00101	190*	C	RKGILL	-	SUBROUTINE, USES RUNGE-KUTTA METHOD TO INTEGRATE	LINK2190	00000n
00101	191*	C		-	DIFFERENTIAL EQUATIONS OF CLOUD	LINK2191	00000n
00101	192*	C		-	(SEE CRW)	LINK2192	00000n
00101	193*	C	RL	-	EMPIRICAL CONSTANT USED TO CALCULATE ENTRAINMENT RATE AND	LINK2193	00000n
00101	194*	C		-	CLOUD VERTICAL RADIUS	LINK2194	00000n
00101	195*	C	RLH	-	ARRAY(260) ATMOSPHERE RELATIVE HUMIDITY MATCHES ALT	LINK2195	00000n
00101	196*	C	RM	-	CLOUD MASS	LINK2196	00000n
00101	197*	C	RMA0	-	INITIAL AIR MASS OF CLOUD	LINK2197	00000n
00101	198*	C	RMIN	-	MINIMUM PARTICLE RADIUS (MICROMETERS IN LINK1 CONVERTED TO	LINK2198	00000n
00101	199*	C		-	METERS IN SUBR. CPV FOR USE THROUGHOUT LINK2)	LINK2199	00000n
00101	200*	C	RMW0	-	INITIAL WATER MASS OF CLOUD	LINK2200	00000n
00101	201*	C	RSTR	-	SUBROUTINE WHICH PRESERVES AND/OR RESTORES CRM VARIABLES	LINK2201	00000n
00101	202*	C	RXP	-	SUBROUTINE, RISE AND EXPANSION MODEL WHICH COMPUTES	LINK2202	00000n
00101	203*	C		-	DEPOSIT INCREMENT POSITIONS THROUGHOUT CLOUD RISE HISTORY	LINK2203	00000n
00101	204*	C	RZT	-	VERTICAL CLOUD RADIUS	LINK2204	00000n
00101	205*	C	S	-	CONDENSED SOIL MIXING RATIO	LINK2205	00000n
00101	206*	C	SCALE	-	ARRAY(10), ATMOSPHERE TABLE ADJUSTMENT FACTORS	LINK2206	00000n
00101	207*	C	SD	-	PARTICLE SIZE GEOMETRIC STANDARD DEVIATION SUPPLIED BY LINK1	LINK2207	00000n
00101	208*	C		-	(DIMENSIONLESS). IF NOT PUNCHED, SD = 4.0	LINK2208	00000n
00101	209*	C		-	APPLICABLE ONLY FOR THE LOGNORMAL DISTRIBUTION	LINK2209	00000n
00101	210*	C	SLDTMP	-	PARTICLE SOLIDIFICATION TEMPERATURE (K)	LINK2210	00000n
00101	211*	C	SLM	-	ARRAY(260) ATMOSPHERE MEAN FREE PATH OF AIR MOLECULES(M)	LINK2211	00000n
00101	212*	C		-	MATCHES ALT	LINK2212	00000n
00101	213*	C	SMALLT	-	TIME AFTER START OF COMPUTATION	LINK2213	00000n
00101	214*	C	SOILHT	-	LATENT HEAT OF VAPORIZATION OF CLOUD SOIL CONSTITUENT	LINK2214	00000n
00101	215*	C	SSAM	-	TOTAL SOIL MASS (KG)	LINK2215	00000n
00101	216*	C	SZRO	-	S AT INITIAL TIME	LINK2216	00000n
00101	217*	C	T	-	CLOUD TEMPERATURE (K)	LINK2217	00000n
00101	218*	C	TE	-	ATMOSPHERIC TEMPERATURE AT CLOUD CENTER ALTITUDE	LINK2218	00000n
00101	219*	C	TME	-	INITIAL TIME (SEC) SUPPLIED BY LINK1	LINK2219	00000n
00101	220*	C	TMP1	-	INITIAL VAPOR TEMPERATURE (K) SUPPLIED BY LINK1	LINK2220	00000n
00101	221*	C	TMP2	-	INITIAL TEMPERATURE OF CONDENSED PHASE MATERIAL IN CLOUD	LINK2221	00000n
00101	222*	C		-	SUPPLIED BY LINK1(NOT USED)	LINK2222	00000n
00101	223*	C	TMSD	-	TIME OF PARTICLE SOLIDIFICATION (SEC) WITHIN CLOUD	LINK2223	00000n
00101	224*	C	TRPL	-	SUBROUTINE, USES LINEAR INTERPOLATION TO COMPUTE VARIABLE	LINK2224	00000n
00101	225*	C		-	CORRESPONDING TO ARGUMENT	LINK2225	00000n
00101	226*	C	TSRD	-	R-RATE CLOUD RISE TERMINATION SWITCH PARAMETER	LINK2226	00000n
00101	227*	C	TSTM	-	TIME AT WHICH NEXT CX ARRAY ENTRIES ARE TO BE MADE	LINK2227	00000n
00101	228*	C	U	-	CLOUD VERTICAL VELOCITY	LINK2228	00000n
00101	229*	C	USOIL	-	SOIL TYPE, 1.0 = SILICEOUS	LINK2229	00000n
00101	230*	C		-	2.0 = CALCAREOUS	LINK2230	00000n



00111	28A*	RED=1000.*DNS	000007
00112	289*	F=0.0	000012
00113	290*	IF(W.GT. 0.0 ) GO TO 5	000013
00115	291*	W=W	000016
00116	292*	F=W	000020
00117	293*	5 CONTINUE	000022
00120	294*	CALL CRM	000022
00120	295*		000022
00120	296*	C COMPITE TIME OF PARTICLE SOLIDIFICATION	000022
00120	297*	C	000022
00121	298*		000023
00124	299*	DO 122 MA=1,MCX	000030
00125	300*	MR=MCX-MA+1	000035
00126	301*	CXTM(MA)=CX(1,MR)	000037
00130	302*	122 CXTM(MA)=CX(9,MR)	000043
00131	303*	CALL TRPL(SLDTMP,MCX,CXTMP,CXTIM,TMCD)	000052
00134	304*	WRITE(15OUT,513)TMSD	000060
00135	305*	513 FORMAT(1/9X,'TIME OF SOIL SOLIDIFICATION = ',F9.4,' SEC')	000060
00136	306*	50 CALL REXP	000062
00137	307*	RETURN	000077
		END	

END OF C MPT. ATION: NO DIAGNOSTICS.

69

00005a  
00007a  
000107

MASS 024  
MASS 025  
MASS 026

SSAVE=F\*((W)\*\*(3.0/3.4))\*((180.0-25CL)\*\*2.0)\*(360.0+75CL)  
250 RETURN  
260 END

24\*  
25\*  
26\*

00116  
00117  
00120

NO DIAGNOSTICS.

END OF COMPILATION:

9:FOR,S CASSANDRA,THRE,R  
FOR 50F3-06/11/76-10:14:49 (2.)

# MAIN PROGRAM

STORAGE USED: CODE(1) 000076; DATA(0) 000035; BLANK COMMON(2) 000000

## COMMON BLOCKS:

0003 SET1 002323

## EXTERNAL REFERENCES (BLOCK, NAME)

0004 FPOVFL  
0005 LINK1  
0006 LINK2  
0007 NINTR\$  
0010 NRDU\$  
0011 NI03\$  
0012 NI02\$  
0013 NERR2\$  
0014 NWDU\$  
0015 NSTOP\$

## STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000024	1F	0001	000043	101L	0001	000055	102L	0000	000025	2F	0001	000072	200L
0000	000026	3F	0003	000000	CAY	0003	000001	DETID	0003	000015	NIAM	0003	000326	DMEAN
0003	000327	DNS	0003	000330	EXPO	0003	000331	FMAS\$	0003	001170	HEIGHT	0000	I	000020
0003	000641	TRI\$TR	0003	000642	IEXEC	0003	I	000643	IRISE	0003	I	000644	ISIN	ISOUT
0000	I	000021	LGO	0000	I	000023	LNK	0000	I	000022	LTHRU	0003	000646	NDSTR
0003	001172	NH0D0	0000	I	000000	NUMTAP	0003	000647	PS	0000	I	000157	SD	SSAM
0003	001161	TME	0003	001162	TMP1	0003	001163	TMP2	0003	001164	T2M	0003	001165	USOIL
0003	001166	VPR	0003	001503	VX	0003	002013	VY	0003	001167	W	0003	001171	ZSCL
0003	001173	ZV												

00101	1*	COMMON/SET1/												
00101	2*	1CAY	,DETID(12)	,DIAM(201)	,DMEAN	,DNS	,EXPO	,ISOUT	,LINK1098					
00101	3*	2FMAS\$(200)	,IEXEC	,IRISE	,IRISE	,ISIN	,T\$OUT	,TMP1	,LINK1099					
00101	4*	3NDSTR	,PS(200)	,SD	,SSAM	,TME	,HEIGHT		,LINK1100					
00101	5*	4TMP2	,T2M	,USOIL	,VPR	,W			,LINK1101					
00101	6*	5ZSCL	,NH0D0	,ZV(200)	,VX(200)	,VY(200)			,LINK1102					
00103	7*	DIMENSION	NUMTAP(15)											
00104	8*	NDIV=0												
00105	9*	CALL FPOVFL												
00106	10*	READ(5,1)	(NUMTAP(I),I=1,15)											
00111	11*	1	FORMAT(1514)											
00112	12*	ISIN=NUMTAP(1)												
00113	13*	ISOUT=NUMTAP(2)												
00114	14*	IRISE=NUMTAP(3)												
00115	15*	READ(I\$IN,2)	LGO,LTHRU											
00121	16*	2	FORMAT(212)											

00122 17\*  
 00123 18\*  
 00124 19\*  
 00127 20\*  
 00130 21\*  
 00131 22\*  
 00132 23\*  
 00134 24\*  
 00137 25\*  
 00140 26\*  
 00141 27\*

GO TO (101,102,200,200), L60  
 101 LNK=1  
 WRITE(ISO,3) LNK  
 3 FORMAT(14H ENTERING LINK ,I2,  
 CALL LINK1  
 102 LNK=2  
 IF(LINK.GT.LTHRU) GO TO 200  
 WRITE(ISO,3) LNK  
 CALL LINK2  
 200 STOP  
 END

END OF COMPT, ATION: NO DIAGNOSTICS.

000031  
 000043  
 000044  
 000052  
 000052  
 000052  
 000055  
 000056  
 000061  
 000067  
 000072  
 000075

Q:FOR S CASSANDRA.DOCXFC.R  
FOR 50E3-06/11/76-10:14:55 (7.)

# MAIN PROGRAM

STORAGE USED: CODE(1) 001074; DATA(0) 024576; BLANK COMMON(2) 000000

## EXTERNAL REFERENCES (BLOCK, NAME)

0003 NINTR\$  
0004 NRDU\$  
0005 NI02\$  
0006 NPRT\$  
0007 NSTOP\$  
0010 NREWS\$  
0011 NRBU\$  
0012 NI01\$  
0013 NERR2\$  
0014 NWDU\$

## STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000302	100L	0001	000444	1170L	0001	000472	119L	0001	00-474	1190L	0001	00017-	12L
0001	000541	123L	0001	000567	125L	0001	000714	132L	0001	000714	140L	0001	000025	16L
0001	000217	20L	0001	000134	2046	0001	000145	2136	0001	000154	2216	0001	000171	2316
0001	000261	2456	0001	000301	30L	0001	000756	300L	0001	000761	305L	0001	000344	3266
0001	000362	3416	0001	000401	3546	0001	001033	370L	0001	001043	372L	0001	001044	375L
0001	000301	40L	0001	000462	4076	0001	000463	4126	0001	000507	4256	0001	000510	4306
0001	001100	4400L	0001	000301	45L	0001	000302	46L	0001	000302	47L	0001	000617	4706
0001	000626	4776	0001	001100	4995L	0001	001144	4998L	0001	000302	50L	0001	000643	5156
0001	000672	5206	0001	000745	5346	0001	001200	6226	0001	001234	6316	0001	001244	6366
0001	001253	6436	0000	024432	8000F	0000	024433	8002F	0000	024434	8003F	0000	024437	8004F
0000	024460	8005F	0000	024464	8006F	0000	024503	80060F	0000	024512	8007F	0000	024517	8008F
0000	024542	8489F	0000	024543	8490F	0000	024546	8491F	0000	024515	8492F	0000	024520	8493F
0000	024531	8494F	0000	024534	8495F	0000	024550	8496F	0001	001152	9995L	0001	001144	9996L
0000	R 004142	ALT	0000	R 000000	ALTHLD	0000	024324	AUXONE	0000	I 024325	AUXTWO	0000	R 001402	BOICOP
0000	R 005556	RSTIM	0000	I 024326	COMBIN	0000	R 003631	DIAM	0000	R 004546	ETA	0000	R 001321	FWASS
0000	R 024341	FW	0000	L 024331	GOBACK	0000	L 024332	GRALCH	0000	R 024426	H	0000	R 024347	HEIGHT
0000	I 024400	IRC	0000	I 024402	IBCM	0000	I 024403	IBP	0000	I 024413	IKLOUP	0000	I 024366	INDXK
0000	I 024431	ITG	0000	I 024335	ISIN	0000	I 024336	ISOUT	0000	I 024376	ISTART	0000	I 024377	ISTOP
0000	L 024334	JUMPTG	0000	I 024364	J	0000	I 024375	JP	0000	I 024401	JTIM	0000	L 024333	JUMPRN
0000	I 024416	LAMNA	0000	I 024430	KTENL	0000	I 024427	KTENS	0000	I 024407	KTIM	0000	I 001616	LAMHLN
0000	I 024414	LK	0000	I 024417	LAMNAX	0000	I 015447	LAPS	0000	I 024413	LFAKO	0000	I 024415	LJ
0000	I 024357	MCX	0000	I 024405	LPSC	0000	I 024410	LWAF	0000	I 024367	MCAUX1	0000	I 024370	MCAUX2
0000	I 024373	NETMUN	0000	I 024355	NHODO	0000	I 024360	NATL	0000	I 024356	NDSTR	0000	I 024363	NDSTRP
0000	I 024371	NTIM	0000	I 024362	NTWO	0000	I 024404	NLAMNA	0000	I 024361	NONE	0000	I 024374	NTARP
0000	R 024337	PI	0000	I 003011	PS	0000	R 000601	RADHLN	0000	I 024365	NUMTIM	0000	I 024323	OPTION
0000	R 024420	RATIOA	0000	R 024354	RFD	0000	R 005152	RHO	0000	R 024412	RWASS	0000	R 024422	RADYSO
0000	R 024343	SLDTMP	0000	R 024342	SSAM	0000	R 024346	SUBWAM	0000	R 024327	TARGET	0000	R 024425	TDSOU
0000	R 024352	TGZ	0000	I 024330	TIMI	0000	R 024344	TMSD	0000	R 001510	TOPCOR	0000	R 006573	TPDQ
0000	R 006427	TRAT	0000	R 005710	TX	0000	R 006054	TY	0000	R 006220	T7	0000	R 002171	VX
0000	R 002501	VY	0000	R 024346	W	0000	R 024423	XATAL	0000	R 024350	X6Z	0000	R 024424	YATAL
0000	R 024351	Y6Z	0000	R 024353	ZBRSTZ	0000	R 001661	ZV	0000	R 024350	X6Z	0000	R 024424	YATAL

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00101 1* DIMENSION
00102 2* 1 ALHLD(11,35),RADHLD(11,35),BOTCOR(2,35),TOPCOR(2,35),LAMHLD(35)
00103 3* DIMENSION
00104 4* 1 ZV(200),VX(200),VY(200),PS(200),FMASS(200),DIAM(201),
00105 5* 2 ALI(260),ETA(260),RH0(260),RSTIM(90)
00106 6* DIMENSION TY(100),TV(100),T7(100),
00107 7* 1 MATODP(35),TRAT(100),TPDG(100,35),LAPS(100,35)
00108 8* INTEGER OPTION,AUXONE,AUXTWO,COMBIN,TARGET,
00109 9* 1 TMT
00110 10* LOGICAL GO BACK, GR AL CH,
00111 11* JUMP RD, JUMP TG
00112 12*
00113 13* C*****
00114 14* C
00115 15* R000 FORMAT(I2)
00116 16* R002 FORMAT( 8I5)
00117 17* R003 FORMAT( 15/ (4E15.5))
00118 18* R004 FORMAT(1H1, 50X,18TARGET COORDINATES / 50X,21HVALUES RELATIVE TO
00119 19* 1 GZ // 10X 3HNO, 10X 1HX, 16X1HY,16X1HZ,16X 1HT /)
00120 20* R005 FORMAT( 10X,13, 3E16.4, F16.1)
00121 21* R006 FORMAT( // 10X,4HPARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS
00122 22* 1 F9.2,2X,2HTO ,F9.2X, 7HWICRONS //
00123 23* 1 )
00124 24* R0060 FORMAT( 10X,19HSECONDS AFTER BURST / 10X,10I10 //)
00125 25* R007 FORMAT( 9X, I4, 10E10.4)
00126 26* C
00127 27* C
00128 28* C
00129 29* C
00130 30* C
00131 31* ISIN=5
00132 32* ISOUT=6
00133 33* PI=3.1415927
00134 34* GO BACK=.TRUE.
00135 35* C
00136 36* C DETERMINE LOGICAL UNIT OF CLOUD TAPF
00137 37* READ(ISIN,8000) IPDQ
00138 38* PRINT 8892,IPDQ
00139 39*
00140 40* .892 FORMAT(' IPDQ ',I2)
00141 41* C
00142 42* C
00143 43* C
00144 44* C
00145 45* C
00146 46* C
00147 47* C
00148 48* C
00149 49* C
00150 50* 16 READ(ISIN,8002) OPTION,
00151 51* AUXONE,AUXTWO
00152 52* 1 PRINT 8893,OPTION,AUXONE,AUXTWO
00153 53* .893 FORMAT(' OPTION ',I2,' AUXONE ',I5,' AUXTWO ',I5)
00154 54* JUMP TG=.FALSE.
00155 55* IF( OPTION .EQ. 0) STOP
00156 56* IF( OPTION .LT. 0) JUMP TG=.TRUE.

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00553 285*      C      NOW SEE IF TARGET IS LOCATED AT A DISTANCE LESS THAN RADIUS
00554 286*      C      FROM CENTER OF CIRCLE WITH COORDINATES (XATALT,YATALT)
00555 287*      C      TDSQ= (XATALT-TX(TARGET))**2+(YATALT-TY(TARGET))**2
00556 288*      C      IF( RADXSQ .LE. TDSQ ) GO TO 499A
00557 289*      C      TARGET IS IN WAFFER SO CALCULATE DENSITY AND SUM
00558 290*      C
00559 291*      C      370 CONTINUE
00560 292*      C      H=ALHLD(NLAMNA,TIMI)-ALHLD(1,TIMI)
00561 293*      C      372 CONTINUE
00562 294*      C      TDSQ(TARGET,JTIM)=RMSSQ/(H*RADXSQ)+TDSQ(TARGET,JTIM)
00563 295*      C      LAPS(TARGET,JTIM)=LPSC
00564 296*      C      GO TO 499B
00565 297*      C      375 CONTINUE
00566 298*      C      TARGET IS IN CLOUD ALTITUDE RANGE
00567 299*      C      PERFORM APPROPRIATE TESTS
00568 300*      C
00569 301*      C      TDSQ=(TOPCOR(1,TIMI)-TX(TARGET))**2+(TOPCOR(2,TIMI)-TY(TARGET)
00570 302*      C      1 )**2
00571 303*      C      RADXSQ=RADHLD(NLAMNA,TIMI)**2
00572 304*      C      380 IF( TDSQ .GT. RADXSQ ) GO TO 499A
00573 305*      C
00574 306*      C      TARGET IS IN CLOUD
00575 307*      C      CALCULATE DENSITY
00576 308*      C      GO TO 370
00577 309*      C
00578 310*      C      400 CONTINUE
00579 311*      C      4995 CONTINUE
00580 312*      C      GRALCHE= TZ(TARGET) .LT. ALHLD(1,TIMI) .OR.
00581 313*      C      1 TZ(TARGET) .GT. ALHLD(2,TIMI)
00582 314*      C      IF( GRALCH ) GO TO 499B
00583 315*      C      TDSQ=(TOPCOR(1,TIMI)-TX(TARGET))**2+
00584 316*      C      1 (TOPCOR(2,TIMI)-TY(TARGET))**2
00585 317*      C      RADXSQ=RADHLD(1,TIMI)**2
00586 318*      C      H=ALHLD(2,TIMI)-ALHLD(1,TIMI)
00587 319*      C      IF( TDSQ .LE. RADXSQ ) GO TO 372
00588 320*      C      998 CONTINUE
00589 321*      C      4998 IS END OF TIMES LOOP
00590 322*      C
00591 323*      C      5000 CONTINUE
00592 324*      C      5000 IS END OF TARGET LOOP
00593 325*      C      GO TO 123
00594 326*      C      9995 CONTINUE
00595 327*      C      GO BACKS .NOT. GO BACK
00596 328*      C
00597 329*      C      9996 CONTINUE
00598 330*      C      PRINT PDOS FOR EACH TARGET FOR THIS COMBIN(ATION) OF
00599 331*      C      PARTICLE SIZE CLASSES
00600 332*      C      WRITE(ISOUT,8006) DIAM(IBP),DIAM(7BCW)
00601 333*      C      DO 9999 KTEMS=1,NETMUN,10
00602 334*      C      KTEML=KTEMS+9
00603 335*      C      IF( KTEML .GT. NUMTIM ) KTEML=NUMTIM
00604 336*      C
00605 337*      C
00606 338*      C
00607 339*      C
00608 340*      C
00609 341*      C
00610 342*      C
00611 343*      C
00612 344*      C
00613 345*      C
00614 346*      C
00615 347*      C
00616 348*      C
00617 349*      C
00618 350*      C
00619 351*      C
00620 352*      C
00621 353*      C
00622 354*      C
00623 355*      C
00624 356*      C
00625 357*      C

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00627 342\*  
 00635 343\*  
 00640 344\*  
 00650 345\*  
 00650 346\*  
 00650 347\*  
 00650 348\*  
 00652 349\*  
 00654 350\*  
 00655 351\*  
 00656 352\*

WRITE(ISOUT,R0060) (WTDOP(J),JEKTENS,KTENL )  
 DO 9008 ITG=1,NTARP  
 -0008 WRITE(ISOUT,R007) ITG,(TPDO(ITG,J),JEKTENS,KTENL)  
 9009 CONTINUE  
 C  
 C SHOULD WE RETURN TO START ANOTHER PARTICLE SIZE COMBINATION  
 IF( GO BACK ) GO TO 119  
 GO BACK \*NOT\* GO BACK  
 GO TO 16  
 END

00121\*  
 00124\*  
 00124a  
 00126\*  
 00126\*  
 00126\*  
 00126\*  
 00126\*  
 00126\*  
 00126\*  
 00127  
 00127a  
 00127\*  
 00127\*

END OF COMPI. ATION: NO DIAGNOSTICS.

QIFOR'S CASSANDRA.DDXXOT.R  
FOR S0F3-06/11/76-10:15:49 (2.)

# MAIN PROGRAM

STORAGE USED: CODE(1) 002\*61; DATA(0) 007604; BLANK COMMON(2) 000000

## COMMON BLOCKS:

0003 ATWO 001010  
0004 PSTT 002426  
0005 WINDS 001130  
0006 RSTWER 002123  
0007 PSTWER 000074

## EXTERNAL REFERENCES (BLOCK, NAME)

0010 DIVY  
0011 PRETRN  
0012 PSTAN  
0013 NOMARG  
0014 STWARG  
0015 MINTR\$  
0016 NRDU\$  
0017 NIOZ\$  
0020 NPRT\$  
0021 NSTOP\$  
0022 NREWS  
0023 NRRUS  
0024 NIOI\$  
0025 NERR2\$  
0026 NRDU\$  
0027 SIN  
0030 COS

## STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	001472	10126	0001	001633	10466	0001	002001	11036	0001	002233	11476	0001	00102	11700L
0001	002256	11776	0001	001101	119L	0001	001103	1190L	0001	000205	12L	0001	002306	12116
0001	002324	12176	0001	002341	12246	0001	001134	123L	0001	001171	1230L	0001	001173	1231L
0001	001175	124L	0001	001211	125L	0001	001320	131L	0001	001747	140L	0001	000022	16L
0001	000216	20L	0001	001404	200L	0001	001456	2000L	0001	000137	2166	0001	000150	2256
0001	001420	225L	0001	001545	227L	0001	001613	230L	0001	000157	2336	0001	001673	235L
0001	001677	240L	0001	000177	2446	0001	001736	249L	0001	001740	250L	0001	001542	2500L
0001	000232	2626	0001	000250	2746	0001	002012	300L	0001	002015	305L	0001	002071	370L
0001	002101	372L	0001	000466	3756	0001	002113	375L	0001	000510	4046	0001	000551	4266
0001	000564	4356	0001	000623	4536	0001	000644	4666	0001	002140	4995L	0001	000271	50L
0001	002206	5000L	0001	000342	52L	0001	000731	5246	0001	000347	53L	0001	000777	5476
0001	000370	55L	0001	000414	56L	0001	001017	5636	0001	000425	57L	0001	000446	58L
0001	000570	61L	0001	000606	62L	0001	001075	6206	0001	000642	63L	0001	000712	630L
0001	001107	6336	0001	000470	635L	0001	000677	649L	0001	000702	650L	0001	000720	66L
0001	001157	6466	0001	000784	67L	0001	000766	68L	0001	000741	680L	0001	000742	685L
0001	001007	69L	0001	001230	7126	0001	001037	7216	0001	001011	75L	0001	000743	7556
0000	007312	8000F	0000	007313	8001F	0000	007315	80010F	0000	007323	8002F	0000	007324	8003F
0000	007327	8004F	0000	007350	8005F	0000	007354	8006F	0000	007373	80060F	0000	007442	8007F

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0000 007544 R070F 0000 007407 R00AF 0000 007420 8009F 0000 007530 8010F 0000 007533 8011F
0000 007545 R013F 0000 007550 8013F 0001 002246 900L 0001 002266 999L 0001 002212 9995L
0001 002214 9996L 0000 002343 9996L 0000 R 007230 APSM 0004 R 001010 ALT 0006 R 000000 ALTHLN
0000 R 007215 ALTMAX 0000 R 007214 ALTMIN 0000 R 007207 ANGLE 0006 R 001606 ROTCOR 0000 R 005322 BPD0
0000 R 007227 BSN 0000 R 001130 BSTM 0000 R 007127 CLDTP 0000 R 001172 COMBIN 0000 R 007231 DERS
0000 R 007217 DELALT 0000 R 007216 DELR 0000 R 000620 DIAM 0000 R 007267 DRADSO 0004 R 001415 DX
0004 002021 DY 0003 R 000000 ETA 0000 R 000310 FMASS 0000 R 007173 FROG 0000 R 007147 FTIM
0004 000404 EV 0000 R 007150 FW 0000 L 007133 GRBACK 0000 L 007134 GRALCH 0000 R 007301 H
0000 R 007156 HFIGT 0000 I 007242 IRC 0000 I 007243 IRCM 0000 I 007244 IBP 0000 I 007254 IKLOIN
0000 I 007144 IPDQ 0000 I 007307 IPDQ 0000 I 007243 IPDQ 0000 I 007140 ISIN 0000 I 007266 IWP
0000 I 007237 ISART 0000 I 007240 ISTOP 0000 I 007303 ITG 0000 I 007302 ITPM 0000 I 007201 JP
0000 I 007175 J 0000 I 007306 JLAT 0000 I 007304 JLAST 0000 L 007135 JUMPRN 0000 L 007136 JUMPT6
0000 I 007235 JPOST 0000 I 007305 JSTRIP 0000 I 007232 JUMP 0000 I 007264 KOUNTX 0000 I 007250 KTIM
0000 I 007236 JATND 0000 I 007271 LAMNA 0000 I 007272 LAMNAY 0000 I 003516 LAPS 0000 I 007241 LASTPS
0006 I 002052 LAMHLD 0000 I 007256 LJ 0000 I 007255 LK 0000 I 007142 MID 0000 I 007270 MDT
0000 I 007251 LKAF 0000 I 007166 MCX 0000 I 007176 MCXM 0000 I 007167 NATL 0000 I 007295 NRSTS
0000 I 007224 NAL 0000 I 007203 NALT 0000 I 007206 NANGL 0000 I 007164 NHODN 0000 I 007245 NLAMNA
0000 I 007234 NCLNT 0000 I 007165 NDSTR 0000 I 007174 NDSTRP 0000 I 007257 NPSTM 0000 I 007222 NR
0000 I 007170 NDNF 0000 I 007210 NDS 0000 I 007211 NDSY 0000 I 007261 NTIM 0000 I 007202 NTIMS
0000 I 007205 NDOF 0000 I 007204 NSTRIP 0000 I 007200 NTRP 0000 I 007177 NUMTIM 0000 L 007137 PST 0000 R 000000 PSTALT
0004 001414 NTOP 0000 I 007171 NTWO 0000 I 007177 NUMTIM 0000 L 007137 PST 0000 R 000062 PSTY
0007 R 000143 PT 0007 R 000036 PSTRHO 0007 R 000024 PSTSA 0007 R 000050 PSTY 0000 R 007260 RATL
0006 R 000703 RADHLD 0000 R 007274 RADLUX 0000 R 007275 RADXSQ 0000 R 007273 RATLOA 0000 R 007212 SSAM
0000 R 007163 RFO 0003 R 000404 RHO 0000 R 007152 SLOTMP 0000 R 007146 SRAT 0000 R 007151 SSAM
0000 R 007223 RNR 0000 R 000000 T 0000 I 007130 TARG 0000 I 007131 TARGET 0000 R 007265 TAS
0000 R 007247 SBRWAM 0000 R 007300 TDSQU 0000 R 007161 TGZ 0000 I 007132 TIMI 0000 R 007153 TMSD
0000 R 007262 TASL 0000 R 007172 TPDQ 0000 R 001630 TRAT 0000 I 001546 TT 0000 R 001242 TX
0000 R 001356 TY 0000 R 001452 TZ 0005 R 000310 VX 0005 R 000620 VY 0000 R 007155 W
0000 R 007276 XATALT 0000 R 007157 XGZ 0005 R 007221 XROT 0000 R 007277 YATALT 0000 R 007160 YGZ
0000 R 007220 YROT

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00101 1* 1 COMMON/ATMO/ ETA(260),RHO(260)
00101 2* 1 COMMON/PSTT/
00103 3* 1T(260),FV(260),ALT(260),NTOP,DY(260),PSWID
00103 4* 1 COMMON/WINDS/
00104 5* 1 ZV(200),VX(200),VY(200)
00104 6* 1 COMMON/BSTWFR/ ALTHLD(11,41),RADHLD(11,41),ROTCOR(2,41),
00105 7* 1 TOPCOR(2,41),LAMHLD(41)
00105 8* 1 COMMON/PSTWFR/ PSTALT(10),PSTRAD(10),PSTSA(10),PSTRHO(10)
00105 9* 1 , PSTX(10), PSTY(10)
00106 10* 1 DIMENSION
00106 11* 1 PSI(200),FMASS(200),DIAM(200),BSTM(90)
00107 12* 1 DIMENSION TX(60),TY(60),TZ(60),TT(50),
00110 13* 1 TRAT(50),TPDQ(900),LAPS(900),RPOD(900)
00111 14* 1 INTEGER OPTION,COMBIN,TARG,TARGET,TIMI,TT
00112 15* 1 LOGICAL GO BACK, GR AL CH,
00112 16* 1 JUMP RD, JUMP TG
00112 17* 2 ,PST
00112 18* C
00112 19* C
00112 20* C*****

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00156 000046
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00159 000058
00160 000062
00161 000066
00162 000070
00163 000074
00164 000078
00165 000082
00166 000086
00167 000090
00168 000094
00169 000098
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00806 002646
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00576 247*

PST=.TRUE.
GO TO 66
43 CONTINUE
70 65 JX=1,MCXM
BSM=(RSTIM(JX+1)+RSTIM(JX))/2.0-TRAT(J)
ASW=ABS(BSM)
DEBS=RSTIM(JX+1)-RSTIM(JX)
IF(ABS(DEBS/2.0-ABSM).LE. FTIM) GO TO 650
IF(ASW) 630,635,635
635 TT(J)=JX
TRAT(J)=(TRAT(J)-RSTIM(JX))/DEBS
GO TO 66
649 TT(J)=JX
GO TO 66
650 TRAT(J)=0.0
IF(ASM .GE. 0.0 ) GO TO 649
TT(J)=JX+1
GO TO 66
670 IF(TRAT(J).LT.RSTIM(JX+1)) GO TO 635
65 CONTINUE
66 CONTINUE
IF( .NOT. PST ) GO TO 68
JUMP=1
DO 67 JX=1,NATL
GO TO (680,685),JUMP
680 IF( ALT(JX) .LE. ZBRSTZ ) GO TO 67
NZBR=JX-1
JUMP=2
685 IF( ALT(JX) .LE. CLDTP ) GO TO 67
NCLDTE=JX
JPOST=NCLDTE-NZBR+1
GO TO 68
67 CONTINUE
68 CONTINUE
C FIND WIND LAYER SURROUNDING A,T(NCLDT) IF NEEDED
JWIND=NHOD
IF( NHODO .LE. 0 ) GO TO 75
DO 69 JX=1,NHODO
IF( ALT(NCLDT) .GT. ZV(JX) ) GO TO 69
JWIND=JX
GO TO 75
69 CONTINUE
75 CONTINUE
IF( JUMP IG ) GO TO 11700
C SHIFT TARGET ALTITUDES TO RENDER THEM RELATIVE TO MSL
C
DO 117 JP=1,NALT
TZ(JP)=TZ(JP)+ZBRSTZ
117 CONTINUE
C *****
11700 CONTINUE
C
C READ INTEGER TO CONTROL NUMBER OF PARTICLE SIZE CLASSES
C BEING SUMMED AT EACH TARGET POINT-COMBIN
C VALUE OF ZERO INDICATES SUMMATION OF ALL PARTICLE SIZE CLASSES
C READ(15IN,8002) COMBIN,ISTART,ISTOP
IF( ISTART .EQ. 0 ) ISTART=NONE

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01072 410*      (BOTCOR(2,TIMT+1))-BOTCOR(2,TIMT))
01073 249 TIMT=10
01074 250 CONTINUE
01075 50 TO( 140,4995), IKLOUD
01076 FIRST TEST IF TARGET IS IN GROSS ALTITUDE RANGE
01077
01078 140 CONTINUE
01079 GRALCHETZ(KOUNTA) .LT. ALTHLD(1,TIMT)
01080 1 .OP. TZ(KOUNTA) .GT. ALTHLD(NLAMNA,TIMT)
01081 2 IF( GR AL CH ) GO TO 5000
01082
01083 TARGET HAS BEEN ACCEPTED FOR REFINEMENT OF RANGE
01084 DETERMINE BETWEEN WHICH TWO LAMINA THE TARGET ALTITUDE FALLS
01085 THEN COMPUTE RADIUS OF WAFER AT THAT ALTITUDE AND CENTER OF
01086 LAMINA AT THAT ALTITUDE
01087 DO 300 LAMNA=2,NLAMNA
01088 IF( TZ(KOUNTA) .GT. ALTHLD(LAMNA,TIMT)) GO TO 300
01089
01090 LAMNAX=LAMNA-1
01091 GO TO 305
01092 300 CONTINUE
01093 305 CONTINUE
01094
01095 IS TARGET ALTITUDE ABOVE CLOUD BOTTOM ALTITUDE
01096 IF YFS SIMPLY GO RETRIEVE RADIUS AND COORDINATES OF CENTER
01097
01098 IF( LAMNAX .GE. LAMHLD(TIMT) ) GO TO 375
01099
01100 CALCULATE RADIUS OF STRUCTURED WAFER AT ALTITUDE TZ WHERE TARGET
01101 IS BELOW CLOUD BOTTOM
01102
01103 RATIOA=(TZ(KOUNTA)-ALTHLD(LAMNAX,TIMT))/
01104 1 (ALTHLD(LAMNAX+1,TIMT)-ALTHLD(LAMNAX,TIMT))
01105
01106 RADIUSX=RADHLD(LAMNAX,TIMT)+(RADHLD(LAMNAX+1,TIMT)-
01107 1 RADHLD(LAMNAX,TIMT))*RATIOA
01108 RADXSQ=RADIUSX*RADIUSX
01109
01110 NOW THAT WE HAVE RADIUS CALCULATE COORDINATES OF CENTER OF LAMINA
01111 AT SAME ALTITUDE
01112
01113 XALTAL=(TOPCOR(1,TIMT)-BOTCOR(1,TIMT))*RATIOA+BOTCOR(1,TIMT)
01114 YALTAL=(TOPCOR(2,TIMT)-BOTCOR(2,TIMT))*RATIOA+BOTCOR(2,TIMT)
01115
01116 NOW SEE IF TARGET IS LOCATED AT A DISTANCE LESS THAN RADIUS
01117 FROM CENTER OF CIRCLE WITH COORDINATES (XALTAL,YALTAL)
01118
01119 TDSQU=(XALTAL-TX(KOUNTX))*2+(YALTAL-TY(KOUNTY))*2
01120
01121 IF( RADX SQ .LE. TDSQU ) GO TO 5000
01122
01123 TARGET IS IN WAFER SO CALCULATE DENSITY AND SUM
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01124 476* 370 CONTINUE
01126 477* H=ALTHLD(NLAWNA,TIMI)-ALTHLD(1,TIMI)
01127 478* 372 CONTINUE
01130 479* TDOO(TARG)=TPDO(TARG)+RWASS/(H*RADX SQ)
01131 480* LAPS(TARG)=LAPS(TARG)+1
01132 481* GO TO 5000
01133 482* 375 CONTINUE
01134 483* TARGET IS IN CLOUD ALTITUDE RANGE
01134 484* PERFORM APPROPRIATE TESTS
01134 485* C
01134 486* C
01134 487* TDSQJ=(TOPCOR(1,TIMI)-TX(KOUNTX))**2*(TOPCOR(2,TIMI)-TY(KOUNTX
01135 488* 1)**2
01135 489* RADXSQ=RADHLD(NLAWNA,TIMI)**2
01136 490* 380 IF( TDSQJ.GT. RADXSQ ) GO TO 5000
01137 491* TARGET IS IN CLOUD
01137 492* CALCULATE DENSITY
01137 493* GO TO 370
01141 494* C
01141 495* C
01141 496* C
01141 497* C
01142 498* 400 CONTINUE
01143 499* 405 CONTINUE
01144 500* GRALCH=IZ(KOUNTA) .LT. ALTHLD(1,TIMI) .OR.
01144 501* 1 TZ(KOUNTA).GT. ALTHLD(2,TIMI)
01145 502* IF( GR AL CH ) GO TO 5000
01147 503* TDSQJ=(ROTCOR(1,TIMI)-TX(KOUNTX))**2+
01147 504* (ROTCOR(2,TIMI)-TY(KOUNTX))**2
01147 505* 1
01150 506* RADXSQ=RADHLD(1,TIMI)**2
01151 507* H=ALTHLD(2,TIMI)-ALTHLD(1,TIMI)
01152 508* IF( TDSQJ.LE. RADXSQ ) GO TO 372
01152 509* C
01152 509* C
01152 509* 5000 CONTINUE
01154 510* 5000 IS END OF TARGET LOOP
01154 511* GO TO 123
01156 512* 9995 CONTINUE
01157 513* GO BACK= .NOT. GO BACK
01160 514* C
01160 515* 9996 CONTINUE
01161 516* PRINT PDQS FOR EACH TARGET FOR THIS COMBINATION OF
01161 517* PARTICLE SIZE CLASSES
01161 518* WRITE(ISOUT,8006) DIAM(IBP),DIAM(IBM)
01162 519* DO 1979 ITPM=1,NTARP
01166 520* BPDQ(ITPM)=BPDQ(ITPM)*1.0E+5
01171 521* GO TO ( 900,999),OPTION
01173 522* 900 CONTINUE
01174 523* WRITE(ISOUT,8007) (ITG,BPDQ(ITG),ITG=1,NTARP)
01175 524* GO TO 9999
01204 525* 999 CONTINUE
01205 526* CALL NOWARG
01206 527* JLAST=(NSTRIP-1)*15+1
01207 528* DO 1984 JSTRIP=1,JLAST,15
01210 529* WRITE(ISOUT,80070)
01213 530* JLAT=JSTRIP+NOXS*(NOYS-1)
01215 531* DO 1980 IPRINT=JSTRIP,JLAT,NOYS
01216 532*

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01221	533*	IP14=IPRINT+14	002324
01222	534*	WRITE(ISOUT,NOIN) (SPNO(JNUM),JNUM=IPRINT,IP14)	002327
01230	535*	CONTINUE	002350
01232	536*	1944 CONTINUE	002350
01234	537*	CAL' STMARG	002350
01235	539*	CONTINUE	002351
01235	539*		002351
01235	541*		002351
01236	542*	SHOULD WE RETURN TO START ANOTHER PARTICLE SIZE COMBINATION	002351
01240	543*	IF( GO BACK ) GO TO 119	002351
01241	544*	GO BACK= .NOT. GO BACK	002351
01242	545*	GO TO 16	002351
		END	002360

3:FOR'S CASSANDRA.PRETRN,R  
FOR 50E3-06/11/76-10:16:04 (1,)

SUBROUTINE PRETRN ENTRY POINT 000503

STORAGE USED: CODE(1) 000530; DATA(0) 000100; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 ATMO 001010  
0004 PSTT 002426  
0005 WINDS 001130

EXTERNAL REFERENCES (BLOCK, NAME)

0006 ALOG10  
0007 XPRR  
0010 ALOG  
0011 NERR35

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001 000037 100L 0001 000067 105L 0001 000122 106L 0001 000252 10aL 0001 000331 110L  
0000 R 000014 A 0001 000166 200L 0001 000217 205L 0001 000441 216G 0001 000417 999L  
0000 R 000007 DEZV 0004 R 001010 ALT 0000 R 000016 AOB 0000 R 000004 CD  
0004 R 000404 FV 0004 R 001415 DX 0004 R 002021 DY 0003 R 000000 ETA 0000 R 000024 FALV  
0000 R 000020 H2 0000 I 000012 I 0000 R 000005 FVLAST 0000 I 000013 IX 0000 I 000001 JCUR  
0000 I 000000 JLAST 0000 I 000026 JPP 0000 I 000027 KX 0004 R 001414 NTOP  
0004 R 002425 PSWID 0000 R 000006 Q 0003 R 000404 RHO 0005 R 000310 VX  
0000 R 000010 VXLAST 0000 R 000022 VXNEXT 0005 R 000620 VY 0000 R 000030 VYNEXT  
0000 R 000002 V0 0000 R 000003 V1 0005 R 000000 ZV

00101 1\* SUBROUTINE PRETRN(FROG,NCLDT,NZBR,JPOST,JWIND)  
00103 2\* COMMON/ATMO/ ETA(260),RHO(260)  
00104 3\* 1 COMMON/PSIT/  
00105 4\* IT(260),FV(260),ALT(260),NTOP,OX(260),DY(260),PSWID  
00106 5\* COMMON/WINDS/  
00107 6\* 1 ZV(200),VX(200),VY(200)  
00108 7\* JLAST=JWIND  
00109 8\* JCUR=JWIND-1  
00110 9\* C CALCULATE FALL VELOCITY FOR PARTICLE WITH SIZE PSWID AT TOP ALTITUDE  
00111 10\* V0=PSWID/ETA(NCLDT)  
00112 11\* VI=PSWID\*V0\*FROG  
00113 12\* CD=VI\*V0\*RHO(NCLDT)  
00114 13\* IF(CD.GT. 140.0 ) GO TO 100  
00115 14\* FVLAST=VI\*(41666.7\*CD\*(-2.3363E+2+CD\*(2.0154-6.0105F-3\*CD)))  
00116 15\* GO TO 105  
00117 16\* 100 CONTINUE  
00117 17\*

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00120 100 Q=ALOG10(CD)-20.773
00121 100 FVLAST=50657.0*V1*CD**((Q-0-443.98)*0.0011235)
00122 200 FVLAST=FVLAST*(1.0+0.233/(PSMID*RHO(NCLDT)))
00123 210 CONTINUE
00124 220 FV(I)=FVLAST
00125 230 NOW CALCULATE THE REST
00126 240 T(I)=0.0
00127 250 IF(JWIND.LE.0) GO TO 106
00128 260 DX(I)=0.0
00129 270 DY(I)=0.0
00130 280 DEZV=ZV(JLAST)-ZV(JCUR)
00131 290 VLAST=VX(JLAST)*(VX(JCUR)-VX(JLAST))/DEZV*(ZV(JLAST)-ALT(NCLDT))
00132 300 VYLAST=VY(JLAST)*(VY(JCUR)-VY(JLAST))/DEZV*(ZV(JLAST)-ALT(NCLDT))
00133 310 CONTINUE
00134 320 DO 1000 I=2,JPOST
00135 330 FIND ALTITUDE INDEX CORRESPONDING TO I-TH ENTRY
00136 340 IX=NCLDT-I+1
00137 350 C
00138 360 C CALCULATE FALL RATE AT THIS ALTITUDE
00139 370 V0=PSMID/ETA(IX)
00140 380 V1=PSMID*V0*FROG
00141 390 CDEVI*V0*RHO(IX)
00142 400 IF(CD.GT. 140.0) GO TO 200
00143 410 FV(I)=V1*(41666.7*CD*(-2.3363E+2+CD*(2.0154-6.9105E-3*CD)))
00144 420 GO TO 205
00145 430 CONTINUE
00146 440 Q=ALOG10(CD)-20.773
00147 450 FV(I)=50657.0*V1*CD**((Q-0-443.98)*0.0011235)
00148 460 FV(I)=FV(I)*(1.0+0.233/(PSMID*RHO(IX)))
00149 470 CONTINUE
00150 480 NOW CALCULATE TIME OF FALL FROM ALT(IX+1) TO THIS ALTITUDE
00151 490 A=ALT(IX+1)-ALT(IX)
00152 500 B=FVLAST-FV(I)
00153 510 A08=A/B
00154 520 T(I)=A08*ALOG(FVLAST/FV(I))
00155 530 IF NEEDED CALCULATE HORIZONTAL TRANSPORT
00156 540 IF(JWIND.LE.0) GO TO 999
00157 550 C CALCULATE HORIZONTAL TRANSPORT FOR ALT(IX) TO ALT(IX+1)
00158 560 DX(I)=0.0
00159 570 DY(I)=0.0
00160 580 FV1=FV(I-1)
00161 590 H2=ALT(IX)
00162 600 H1=ALT(IX+1)
00163 610 HOW FAR CAN WE INTEGRATE IN THIS STEP
00164 620 IF(H2.LT. ZV(JCUR)) GO TO 110
00165 630 WE CAN FINISH IN THIS STEP
00166 640 CALCULATE WIND VELOCITIES AT ALTITUDE H2
00167 650 VXNEXT=VX(JLAST)*(VX(JCUR)-VX(JLAST))/DEZV*(ZV(JLAST)-H2)
00168 660 VYNEXT=VY(JLAST)*(VY(JCUR)-VY(JLAST))/DEZV*(ZV(JLAST)-H2)
00169 670 FALV=(FV1+FV(I))/2.0
00170 680 DX(I)=DX(I)+(VXLAST+VXNEXT)*(H1-H2)/FALV
00171 690 DY(I)=DY(I)+(VYLAST+VYNEXT)*(H1-H2)/FALV
00172 700 DX(I)=DX(I)/2.0
00173 710 DY(I)=DY(I)/2.0
00174 720 VLAST=VXNEXT
00175 730 VYLAST=VYNEXT
00176 740 GO TO 999
00177
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AD-A063 537

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND ABERD--ETC F/G 18/3  
USER'S MANUAL FOR CASSANDRA: CLOUD SNAPSHOTS OF DUST RAISED ALO--ETC(U)  
NOV 78 R L SHOWERS, C CRISCO

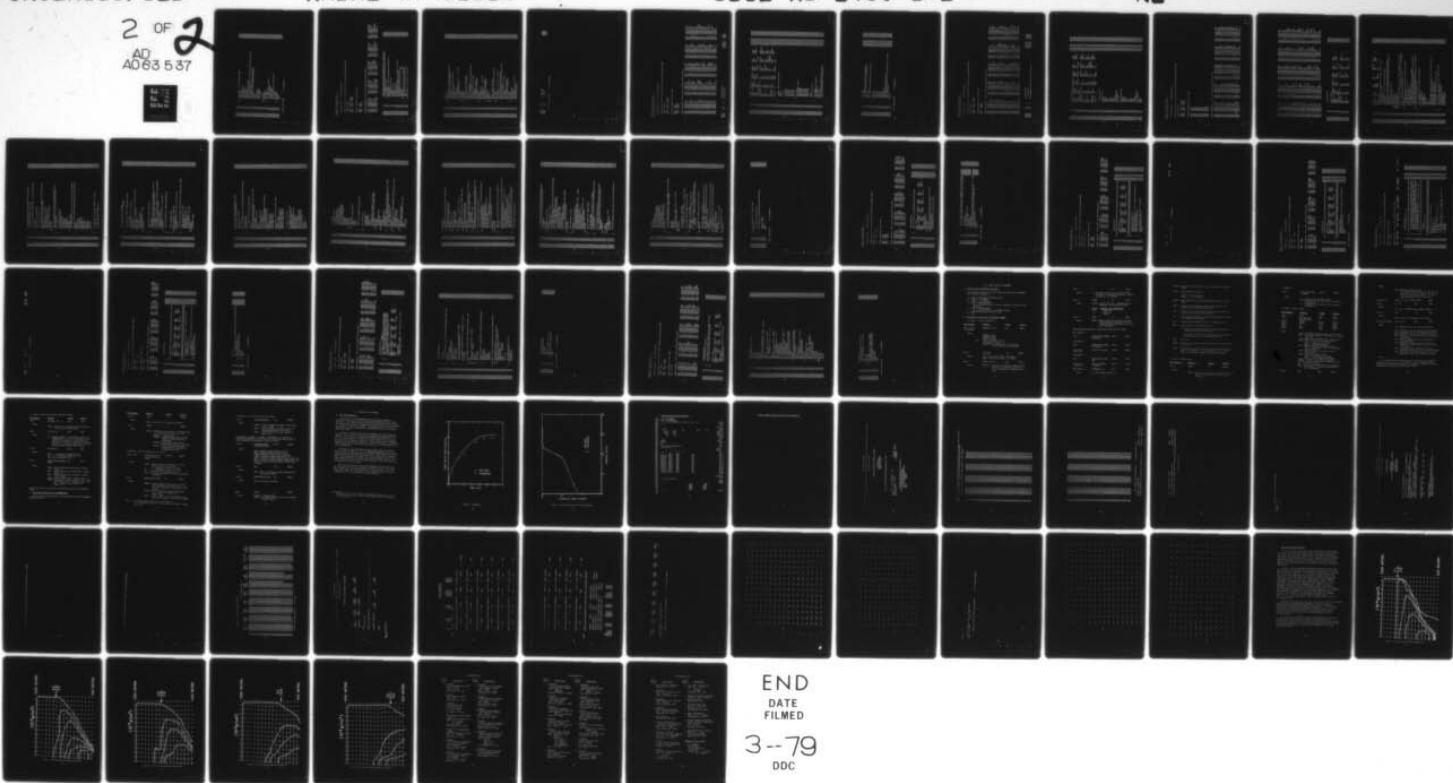
UNCLASSIFIED

ARBRL-TR-02116

SBIE-AD-E430 152

NL

2 OF 2  
AD  
A063 537



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000324 000327 000331 000334 000337 000340 000344 000351 000361 000366 000376 000401 000405 000407 000411 000415 000415 000415 000417 000417 000422 000429 000429 000436 000441 000447 000451
WIND CHANGES IN THIS ALTITUDE RANGE
CONTINUE
H2=7V(JCUR)
VXNEXT=VX(JCUR)
VYNEXT=VY(JCUR)
JLAST=JLAST-1
JCUR=JLAST-1
DEZV=7V(JLAST)-7V(JCUR)
FV2=EV(I-1)+(EV(I)-FV(I-1))*(,LT(IX+1)-H2)/(ALT(IX+1)-ALT(IX))
FALV=(FV1+FV2)/2.0
DX(I)=DX(I)+(VXLAST+VXNEXT)*(H1-H2)/FALV
DY(I)=DY(I)+(VYLAST+VYNEXT)*(H1-H2)/FALV
FV1=EV2
H1=H2
H2=ALT(IX)
VXLAST=VXNEXT
VYLAST=VYNEXT
GO TO 108

999 CONTINUE
FVLAST=EV(I)
900 CONTINUE
JPP=JPOST+1
IF( JPP.GT. 260 ) RETURN
DO 1500 KX=JPP,260
FV(KX)=FV(JPOST)
KXE=NCLOT-KX+1
T(KX)=(ALT(KX)+1)-ALT(KX))/(EV,KX)

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Q:FOR.S CASSANDRA.PSTR.R  
FOR S0F3-06/11/76-10:16:09 (,)

SUBROUTINE PSTR(1) ENTRY POINT 000335

STORAGE USED: CODE(1) 000357; DATA(0) 000041; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 PSTWR 000074  
0004 PSTT 002426  
0005 WINDS 001130

EXTERNAL REFERENCES (BLOCK, NAME)

0006 ALOG  
0007 FXP  
0010 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000053	100L	0001	000022	110G	0001	000116	150L	0001	000121	16L	0001	00201	200L
0001	000316	2000L	0001	000204	210L	0001	000224	225L	0001	000160	250L	0001	00275	300L
0001	000040	4AL	0001	000042	50L	0004	R 001010	ALT	0004	R 000005	C	0004	R 000006	DA
0000	R 000007	7ATC	0000	R 000011	DT	0004	R 001415	DX	0004	R 002021	DY	0004	R 000004	FV
0000	R 000010	FVA	0000	I 000001	I	0000	000015	INJP\$	0000	I 000003	K	0000	I 000004	L
0000	I 000000	NM	0004	001414	NTOP	0004	002425	PSMID	0003	R 000000	PSTALY	0003	R 000012	PSTRAN
0003	000036	PSTRHO	0003	R 000024	PSTSA	0003	R 000050	PSTX	0003	R 000062	PSTY	0004	R 000000	T
0000	R 000012	TERAC	0000	R 000002	TSUM	0005	000310	VX	0005	000620	VY	0005	000000	ZV

00101	1*	SUBROUTINE PSTRAN(TAS, NPSTW, NHODO, ZBRSTZ, NCLDT, JPOST, JWNID )	000004
00103	2*	COMMON/PSTRFR/ PSTALT(10), PSTRAD(10), PSTSA(10), PSTRHO(10),	000004
00103	3*	1 PSTX(10), PSTY(10)	000004
00104	4*	COMMON/PSTT/	000004
00104	5*	1T(260), FV(260), ALT(260), NTOP, DX(260), DY(260), PSWID	000004
00105	6*	COMMON/WINDS/	000004
00105	7*	1 ZV(200), VX(200), VY(200)	000004
00106	8*	NM=NCLDT-1	000004
00107	9*	DO 2000 I=1, NPSTW	000004
00112	10*	TSUM=0.0	000004
00112	11*	C IS WAFER ABOVE SZ	000029
00113	12*	IF( (PSTALT(I)+PSTSA(I))-LT. ZBRSTZ) GO TO 2000	000029
00115	13*	IF( (PSTALT(I).GT. ZBRSTZ) GO TO 48	000029
00117	14*	PSTALT(I)=PSTALT(I)-FV(JPOST)*TAS	000027
00120	15*	GO TO 2000	000034
00121	16*	48 CONTINUE	000034
00121	17*	C FIND TIME TO NEXT ALTITUDE INTERFAC	000044
00121	18*	C FIND TIME TO NEXT ALTITUDE INTERFAC	000044
00122	19*	FIND TIME TO NEXT ALTITUDE INTERFAC	000044
00123	20*	50 IF( PSTALT(I).GT. ALT(K) ) GO TO 100	000044

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00125 21* K=K-1
00126 22* GO TO 50
00127 23* 100 CONTINUE
00127 24* C FIND TRANSPORT TIME FROM PSTALT(I) TO ALT(K)
00127 25* C FIRST FIND FALL VELOCITY AT PSTALT(I)
00130 26* L=VCL0T-K+1
00131 27* C=(FV(L-1)-FV(L))/(ALT(K+1)-ALT(K))
00132 28* D=PSTALT(I)-ALT(K)
00133 29* DATC=D*A*C
00134 30* FVA=FV(L)+DATC
00135 31* IF (ABS(DATC/FVA).LE. .001 ) GO TO 150
00137 32* DT=1./C*ALOG(FVA/FV(L))
00140 33* GO TO 160
00141 34* DT=DA/FVA
00142 35* 150 CONTINUE
00143 36* 160 CONTINUE
00144 37* IF (DT .LT. TAS ) GO TO 250
00144 38* FINAL ALTITUDE IS IN THIS LAYER
00146 39* DT=TAS
00146 40* C FIND FINAL ALTITUDE
00147 41* PSTALT(I)=PSTALT(I)-FVA/C*(1.0-EXP(-(C*DT)))
00147 42* SHIFT X,Y IF NEEDED
00150 43* IF (NH000 .LE. 0 ) GO TO 2000
00152 44* TFRAC=DT/T(L)
00153 45* PSTX(I)=PSTX(I)+TFRAC*DX(L)
00154 46* PSTY(I)=PSTY(I)+TFRAC*DY(L)
00155 47* GO TO 2000
00156 48* 250 CONTINUE
00157 49* PSTALT(I)=ALT(K)
00160 50* IF (NH000 .LE. 0 ) GO TO 200
00162 51* TFRAC=DT/T(L)
00163 52* PSTX(I)=PSTX(I)+TFRAC*DX(L)
00164 53* PSTY(I)=PSTY(I)+TFRAC*DY(L)
00165 54* 200 CONTINUE
00166 55* TSUM=TSUM+DT
00167 56* 210 K=K+1
00170 57* L=L+1
00171 58* IF (L.LE.JPOST) GO TO 225
00173 59* PSTALT(I)=PSTALT(I)-FV(JPOST)*(TAS-TSUM)
00174 60* GO TO 2000
00175 61* 225 CONTINUE
00176 62* IF ( (TSUM+T(L)) .LE. TAS ) GO TO 300
00200 63* DT=TAS-TSUM
00201 64* C=(FV(L-1)-FV(L))/(ALT(K+1)-ALT(K))
00202 65* PSTALT(I)=PSTALT(I)-FV(L-1)/C*(1.0-EXP(-(C*DT)))
00202 66* SHIFT X,Y IF NEEDED
00203 67* IF (NH000 .LE. 0 ) GO TO 2000
00205 68* TFRAC=DT/T(L)
00206 69* PSTX(I)=PSTX(I)+TFRAC*DX(L)
00207 70* PSTY(I)=PSTY(I)+TFRAC*DY(L)
00210 71* GO TO 2000
00211 72* 300 CONTINUE
00212 73* PSTALT(I)=ALT(K)
00213 74* TSUM=TSUM+T(L)
00214 75* IF (NH000 .LE. 0 ) GO TO 210
00216 76* PSTX(I)=PSTX(I)+DX(L)
00217 77* PSTY(I)=PSTY(I)+DY(L)

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00220  
00221  
00223  
00224

76\*  
70\*  
80\*  
61\*

GO TO 210  
AND CONTINUE  
RETURN  
END

END OF COMPUTATION:

NO DIAGNOSTICS.

000314  
000317  
000317  
000356

3:FORAS PASSANDRA.RKCLP  
FOR SNE3-06/11/76-10:10:13 (1.)

SUBROUTINE RKGILL ENTRY POINT 000266

STORAGE USED: CODE(1) 000077; DATA(0) 000073; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SET1 002323  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 DERIV  
0006 TRPL  
0007 NERR2\$  
0010 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000066	I	0001	000165	INL	0001	000073	1376	0001	000110	1426	0001	00013	1556	
0001	000154	1A4G	0001	000025	20L	0001	000103	3L	0001	000250	30L	0001	000125	SL	
0001	000147	7L	0004	R	000000	ALT	0004	000404	ATP	0004	001010	R0	000000	CAY	
0004	001011	CG	0004	001321	CHANGE	0004	001322	CMLR	0004	R	001010	R0	000000	CAY	
0004	003130	C3	0004	003131	C6	0004	R	003132	DEK	0004	000001	DETIN	000000	C2	
0003	000326	DMEAN	0004	003133	DNID	0003	000327	DNS	0004	R	003147	DPW	000015	DIAM	
0004	R	003151	DST	0004	003152	DST0	0004	003153	DST1	0004	R	003154	DST2	000015	DS
0004	R	003156	DU	0000	R	000000	DVRL	0004	R	003157	DWT	0004	R	003155	DT
0004	R	003162	ED	0004	R	003163	EK	0004	R	003164	EPS	0004	R	003161	DZ
0003	000330	EXPO	0004	003572	F	0003	000331	FMASS	0004	003573	FW	0004	003574	GRV	
0000	R	000030	H	0003	001170	HEIGHT	0004	004200	HLR	0004	004201	HOR	000041	INISTP	
0003	000642	IFXFC	0000	000052	INJPS	0004	004202	IPAM	0004	004203	IRAD	000043	IRISE	000043	IRISE
0003	000644	ISIN	0003	000645	ISOUT	0000	I	000032	J	0004	004204	KCLD	000043	KDI	
0004	004206	KRX	0004	I	004207	KS	0004	004210	KSV	0000	I	000031	KYCL	000043	KDI
0004	004212	MVYA	0004	004213	N	0003	000646	NOSTR	0003	001172	NH000	0004	004211	MCX	
0004	I	004215	NPVA	0004	004216	P	0000	R	000033	PAR	0004	R	004217	PS	
0004	004623	PA	0004	004624	QI	0004	004625	R	0004	004626	RA	0004	004627	RFD	
0004	004630	RHZ	0000	R	000020	RKG	0004	R	005234	RL	0004	R	005641	RM	
0004	R	005642	R7T	0004	R	005643	S	0004	005644	SAVE	0003	001157	SD	005645	SLOTWP
0004	005646	SLM	0004	006252	SMALLT	0003	001160	SSAM	0004	006253	SZRO	0004	R	006254	T
0004	006255	TF	0003	001161	TME	0003	001162	TWP1	0003	001163	TWP2	0004	R	006256	TWSD
0003	001164	T2M	0004	R	006257	U	0004	001165	USOIL	0004	R	006260	V	000010	VRL
0003	001166	VPR	0003	001503	VX	0003	002013	VY	0004	006261	V790	0003	R	001147	W
0004	R	006262	WT	0004	R	006263	X	0004	006264	XE	0004	006265	Y	000010	W
0004	006576	ZRFR	0004	006577	ZBRSTZ	0004	006600	ZLMT	0004	001171	ZSCL	0003	R	006575	Z
													0003	001173	ZV

00101 1\* C  
00101 2\* C  
00101 3\* C  
SUBROUTINE RKGILL  
18 AUGUST 1969

RKGIL001  
RKGIL002  
RKGIL003

000000  
000000  
000000

4*	COMMON /SET1/	DETID(12)	DTAM(201)	DMEAN	DNS	EXP0	KGIL004
1*	1CAY	DETID(12)	DTAM(201)	DMEAN	DNS	EXP0	KGIL004
2*	2FMA5(200)	INDSTR	IEXEC	IRISE	ISIN	TSOUT	KGIL005
3*	3WDST0	PS(200)	SD	SSAM	TME	TWP1	KGIL006
4*	4TSM	TSM	USOIL	VPR	W	HEIGHT	KGIL007
5*	5ZSCL	NHOD0	ZV(200)	VX(200)	VY(200)		KGIL008
6*	COMMON /CLOUD/						KGIL009
7*	7ALT(260)	ATP(260)	R0	CG(200)	CHANGE		KGIL010
8*	8C2X(10.90)	C2	C3	C6	DEK	CMR	KGIL011
9*	9DRM	DS	DST	DST0	DST1	DNID(12)	KGIL012
10*	10DT	DU	DWT	DX	DZ	DST2	KGIL013
11*	11SEK	EPS	ES	ETA(260)	F	FD	KGIL014
12*	126GRV(260)	HLR	HOR	IPAM	F	FW	KGIL015
13*	13KDI	KRX	KS	KSV	MCX	KCLD	KGIL016
14*	14NN	NNN	NPVA	P	MCX	MWYA	KGIL017
15*	15GDI	R	RA	RFD	PR5(260)	PW	KGIL018
16*	161RLH(260)	RM	RZT	S	RHZ(260)	RL	KGIL019
17*	17SLM(260)	SMALLT	SZRO	T	SAVE	SLDTP	KGIL020
18*	18V	V	VZRO	WT	TE	THSD	KGIL021
19*	19Y(200)	Z	ZBFR	ZB0STZ	X	XE	KGIL022
20*	20Z				ZLMT		KGIL023
21*	21H=DT						KGIL024
22*	22KS=0						KGIL025
23*	23KYCL=1						KGIL026
24*	24VBL(1)=WT						KGIL027
25*	25VBL(2)=RM						KGIL028
26*	26VBL(3)=U						KGIL029
27*	27VBL(4)=X						KGIL030
28*	28VBL(5)=T						KGIL031
29*	29VBL(6)=Z						KGIL032
30*	30VBL(7)=EK						KGIL033
31*	31VBL(8)=S						KGIL034
32*	32CALL DERIV						KGIL035
33*	33IF(U, EQ, 0.0)						KGIL036
34*	34VBL(3)=0.						KGIL037
35*	35DVBL(1)=DMT						KGIL038
36*	36DVBL(2)=DRM						KGIL039
37*	37DVBL(3)=DU						KGIL040
38*	38DVBL(4)=DX						KGIL041
39*	39DVBL(5)=DT						KGIL042
40*	40DVBL(6)=DZ						KGIL043
41*	41DVBL(7)=DEK						KGIL044
42*	42DVBL(8)=DS						KGIL045
43*	43KS=KS+1						KGIL046
44*	44GO TO (1,3,5,7),KS						KGIL047
45*	45DO 2 J=1,8						KGIL048
46*	46VAL(J)=VBL(J)+0.5*H+DVBL(J)						KGIL049
47*	47RK(G(J)=DVBL(J)						KGIL050
48*	48GO TO 10						KGIL051
49*	49DO 4 J=1,8						KGIL052
50*	50VAL(J)=VBL(J)+.2928932*H*(NV(L(J))-KG(J))						KGIL053
51*	51RK(G(J)=.56578644*DVBL(J)+.12132034*KG(J)						KGIL054
52*	52						KGIL055
53*	53						KGIL056
54*	54						KGIL057
55*	55						KGIL058
56*	56						KGIL059
57*	57						KGIL060
58*	58						KGIL061
59*	59						KGIL062
60*	60						KGIL063

00153	61*	GO TO 10	RK6IL061	00012*
00154	62*	5 DO 4 J=1,8	RK6IL062	00012*
00157	63*	VAL(1)=VAL(J)+1.7071062*H*(NVAL(J)-RK6(J))	RK6IL063	00013*
00160	64*	6 RK6(J)=3.41421355*NVAL(J)-4.1213203*RK6(J)	RK6IL064	00013*
00162	65*	GO TO 10	RK6IL065	00014*
00163	66*	7 DO 4 J=1,8	RK6IL066	00014*
00166	67*	8 VAL(J)=VAL(J)+.16666667*H*(NVAL(J)-2.*RK6(J))	RK6IL067	00015*
00166	68*		RK6IL068	00015*
00170	69*	KYCL=2	RK6IL069	00016*
00171	70*	10 WTEVAL(1)	RK6IL070	00016*
00172	71*	RM=VAL(2)	RK6IL071	00016*
00173	72*	U=VAL(3)	RK6IL072	00017*
00174	73*	X=VAL(4)	RK6IL073	00017*
00175	74*	T=VAL(5)	RK6IL074	00017*
00176	75*	Z=VAL(6)	RK6IL075	00017*
00177	76*	E=VAL(7)	RK6IL076	00020*
00200	77*	S=VAL(8)	RK6IL077	00020*
00201	78*	RZT=PL*(Z-R0)	RK6IL078	00020*
00202	79*	CALL TRPL(Z,NPVA,ALT,PRS,POP)	RK6IL079	00020*
00203	80*	V=2.27*T*RM*(1.+X)/PQR/(1.+X+c*WT)*1.0+X*29./1R.//(1.0+X)	RK6IL080	00021*
00204	81*	GO TO(20,30),KYCL	RK6IL081	00024*
00205	82*	30 RETURN	RK6IL082	00025*
00206	83*	END	RK6IL083	00027*

END OF COMPT. ATION: NO DIAGNOSTICS.

3:FOR'S CASSANDRA-RSTR.R  
FOR 50E3-06/11/76-10:16:19 (1.)

SUBROUTINE RSTR ENTRY POINT 000122

STORAGE USED: CODE(1) 000133; DATA(0) 000360; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SET1 002123  
0004 CLOUD 006601

EXTERNAL REFERENCES (BLOCK, NAME)

0005 NERR23  
0006 NERR33

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000012	1L	0001	000040	122G	0001	000077	144G	0001	000044	3L	0001	000101	5L
0004	000000	ALT	0004	000404	ATP	0004	001010	80	0003	000000	CAY	0004	001011	C6
0004	001321	CHANGE	0004	001322	CWLR	0004	001323	CX	0004	003127	C2	0004	001330	C3
0004	003131	C6	0004	003132	DEK	0003	000001	DETID	0003	000015	DIAM	0004	000326	DMEAN
0004	003133	DNIN	0003	000327	DNS	0004	003147	DRM	0004	003150	DS	0004	003151	DST
0004	003152	DSTN	0004	003153	DST1	0004	003154	DST2	0004	003155	DT	0004	003156	DU
0004	003157	DWT	0004	003160	DX	0004	003161	DZ	0004	003162	ED	0004	003163	EX
0004	003164	FPS	0004	003165	FW	0004	003166	ETA	0003	000330	EXP0	0004	003572	F
0003	000331	FWASS	0004	003573	FW	0004	003574	GRV	0003	001170	HEIGHT	0004	004200	HLR
0004	004201	HOB	0003	000641	IOISTR	0003	000642	IEXEC	0000	000337	INUP%	0004	004202	IPAM
0004	004203	IRAD	0003	000643	IRISE	0003	000644	ISIN	0003	000645	ISOUT	0004	004204	KCLD
0004	004205	KOI	0004	004206	KPX	0004	004207	KS	0004	004210	KSV	0004	004211	MCX
0004	004212	MYA	0004	004213	N	0003	000646	NDSTR	0003	001172	NHDDO	0004	004214	NNN
0000	000334	NP	0004	004215	NPVA	0004	004216	P	0000	000332	PEK	0000	000333	PRM
0004	004217	PRS	0000	000333	PRZT	0003	000647	PS	0000	000334	PSS	0000	000335	PT
0000	000326	PU	0000	000327	PV	0004	004623	PW	0000	000330	PWT	0000	000331	PX
0000	000000	PY	0000	000332	PZ	0004	004624	QI	0004	004625	R	0004	004626	RA
0004	004627	RFD	0004	004630	RHZ	0004	005234	RL	0004	005235	RLH	0004	005641	RM
0004	005642	R7T	0004	005643	S	0004	005644	SAVE	0003	001157	SD	0004	005645	SLDIMP
0004	005646	SLM	0004	006252	SWALLT	0003	001160	SSAM	0004	006253	SZDO	0004	006254	T
0004	006255	TE	0003	001161	TWE	0003	001162	TUPI	0003	001163	TMP2	0004	006256	TMSD
0003	001164	T2M	0004	006257	U	0003	001165	USOIL	0004	006260	V	0003	001166	VPR
0003	001503	VX	0003	002013	VY	0004	006261	V7RO	0003	001167	W	0004	006262	WT
0004	006263	X	0004	006264	XE	0004	006265	Y	0004	006575	Z	0004	006576	ZBFR
0004	006577	ZRRSTZ	0004	006600	ZLWT	0003	001171	ZSCL	0003	001173	ZV			

00101	1*	C	SUBROUTINE RSTR	RSTR 001	000002
00101	2*	C	20 AUGUST 1969	RSTR 002	000003
00101	3*	C		RSTR 003	000003
00101	4*	C		RSTR 004	000003
00101	5*	C	RSTR PRESERVES AND/OR RESTORES CRM VARIABLES	RSTR 005	000003

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00101 000002 RSTR 006
00102 000002 RSTR 007
00103 000002 RSTR 008
00104 000002 RSTR 009
00105 000002 RSTR 010
00106 000002 RSTR 011
00107 000002 RSTR 012
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00153 000002 RSTR 058
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00155 000002 RSTR 060
00156 000002 RSTR 061
00157 000002 RSTR 062

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6\* 00101 000002 RSTR 006  
 7\* 00102 000002 RSTR 007  
 8\* 00103 000002 RSTR 008  
 9\* 00104 000002 RSTR 009  
 10\* 00105 000002 RSTR 010  
 11\* 00106 000002 RSTR 011  
 12\* 00107 000002 RSTR 012  
 13\* 00108 000002 RSTR 013  
 14\* 00109 000002 RSTR 014  
 15\* 00110 000002 RSTR 015  
 16\* 00111 000002 RSTR 016  
 17\* 00112 000002 RSTR 017  
 18\* 00113 000002 RSTR 018  
 19\* 00114 000002 RSTR 019  
 20\* 00115 000002 RSTR 020  
 21\* 00116 000002 RSTR 021  
 22\* 00117 000002 RSTR 022  
 23\* 00118 000002 RSTR 023  
 24\* 00119 000002 RSTR 024  
 25\* 00120 000002 RSTR 025  
 26\* 00121 000002 RSTR 026  
 27\* 00122 000002 RSTR 027  
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 41\* 00136 000002 RSTR 041  
 42\* 00137 000002 RSTR 042  
 43\* 00138 000002 RSTR 043  
 44\* 00139 000002 RSTR 044  
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 46\* 00141 000002 RSTR 046  
 47\* 00142 000002 RSTR 047  
 48\* 00143 000002 RSTR 048  
 49\* 00144 000002 RSTR 049  
 50\* 00145 000002 RSTR 050  
 51\* 00146 000002 RSTR 051  
 52\* 00147 000002 RSTR 052  
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 58\* 00153 000002 RSTR 058  
 59\* 00154 000002 RSTR 059  
 60\* 00155 000002 RSTR 060  
 61\* 00156 000002 RSTR 061  
 62\* 00157 000002 RSTR 062

COMMON /SET1/  
 1CAY ,DETID(12)  
 2FMAS(200),TOTSTR  
 3NDST2 ,PS(200)  
 4TMP2 ,T2W  
 5ZSCL ,NHODD  
 COMMON /CLOUD/  
 1ALT(>60) ,ATP(260)  
 2CX(10,90) ,C2  
 3DRM ,DS  
 4DT ,DU  
 5EK ,EPS  
 6GRV(>60) ,HLR  
 7KDI ,KRX  
 8N ,NNN  
 9QI ,R  
 10RLH(>60) ,RM  
 11SLM(>60) ,SMALLT  
 12V ,V  
 13Y(200) ,Z

DIMENSION PY(210)  
 GO TO(1,3),KSV  
 1 PEK=FK  
 PRM=PM  
 PSS=SS  
 PT=ET  
 PUEU  
 PV=V  
 PWT=WT  
 PX=X  
 PZEZ  
 PRZT=RZT  
 DO 2 NP=1,NDSTR  
 2 PY(NP)=Y(NP)  
 GO TO 5  
 3 SMALLT=SMALLT-DST  
 DST=0.5  
 EK=PEK  
 RM=PRM  
 S=PSS  
 T=PT  
 U=PU  
 V=PV  
 WT=PWT  
 X=PX  
 Z=PZ  
 RZT=PRZT  
 DO 4 NP=1,NDSTR  
 4 Y(NP)=PY(NP)  
 N=3  
 5 RETURN  
 END

Q:FOR'S CASSANDRA.RSXP,R  
FOR 50F3-06/11/76-10:16:24 (1)

SUBROUTINE RSXP ENTRY POINT 002235

STORAGE USED: CODE(1) 002262; DATA(0) 002735; BLANK COMM(2) 000000

COMMON BLOCKS:

0003 SET1 002323  
0004 CLOUD 006601  
0005 DRIFT 001453  
0006 WAFER 000423

EXTERNAL REFERENCES (BLOCK, NAME)

0007 WINDA  
0010 HEIT  
0011 WINDB  
0012 NROUS  
0013 NIO3\$  
0014 NIO2\$  
0015 NWDUS  
0016 NIO1\$  
0017 NREWS  
0020 NWBUS  
0021 XPRR  
0022 NERR2\$  
0023 NWEFS  
0024 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	002036	1023G	0001	002045	1032G	0001	002076	1050G	0001	002112	1060G	0001	002137	1072G
0001	002140	1074G	0001	000245	12L	0001	000004	122G	0001	000254	14L	0001	000262	15L
0001	000270	16L	0001	000200	17L	0001	000161	214G	0001	000207	227G	0001	000343	24L
0001	000235	243G	0001	000351	25L	0001	000247	255G	0001	000354	26L	0001	000247	260G
0001	000356	27L	0001	000365	29L	0000	002441	3000F	0000	002442	3001F	0000	002443	3002F
0000	002445	3003F	0000	002447	3004F	0000	002515	3005F	0000	002575	3006F	0000	002614	3010F
0000	002627	3011F	0000	002632	3012F	0001	000335	310G	0001	000475	32L	0001	000411	364G
0001	000443	373G	0001	000452	401G	0001	000467	411G	0001	000506	422G	0001	000545	435G
0001	000551	44L	0001	000607	445G	0001	000631	456G	0001	000660	464G	0001	001761	499AL
0001	001030	5000L	0001	002003	5010L	0001	002060	5011L	0001	001074	5040L	0001	001103	5045L
0001	001123	5100L	0001	000754	524G	0001	001135	5400L	0001	001145	5420L	0001	001164	5425L
0001	001202	5450L	0001	001211	5460L	0001	001223	5470L	0001	001247	5475L	0001	001265	5500L
0001	001044	554G	0001	001275	5600L	0001	001353	5700L	0001	001466	5708L	0001	001470	5710L
0001	001547	5800L	0001	001662	5820L	0001	002121	5830L	0001	002151	5831L	0001	001342	646G
0001	001435	661G	0001	002157	6990L	0001	001674	7000L	0001	001536	707G	0001	001614	725G
0001	001631	734G	0001	0001740	763G	0000	R 002434	AFF	0000	R 002435	AFFIC	0004	R 000000	ALT
0000	R 000070	ALTHLD	0000	R 000032	ALTMID	0000	R 002160	ANIMAL	0004	000404	ATP	0000	R 000000	ROYALTY
0000	R 001650	ROTCOR	0000	R 000060	ROTX	0004	001010	BN	0003	000000	CAY	0004	001011	CG
0004	001321	CHANGE	0004	001322	CMLR	0004	R 001323	CX	0004	003127	C2	0004	003130	C3
0004	003131	C4	0004	003132	DEK	0000	R 002406	DEFLAM	0000	R 002402	DENOM	0003	R 000001	DETID





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000104 WRITE(ISOOT,3005) FW,SSAM,SLOTMP,TW,DS,SD,W,HEIGHT,REF,
000105 1 (CTID(J),J=1,12),
000106 2 (TC(J),J=1,19),XGZ,YGZ,TGZ,NSURD
000107
000108 CHECK IF WIND SHIFTS ARE BEING MADE. IF NOT SET HONO FALSE
000109
000110 HONO=.TRUE.
000111 IF (HONO.EQ. 0) HONO=.FALSE.
000112
000113 IF(.NOT. HONO) GO TO 17
000114
000115 CALCULATE SLOPE FOR AUXILIARY FUNCTION TO HASTEN WIND LAYER
000116 INDEX DETERMINATION AND MAX INTERCEPT
000117 YMAX=1.0
000118 SLOPE=ZV(NHONO)/FLOAT(NHONO)
000119 DO 10 I=1,NHONO
000120 YTEST=ZV(I)-SLOPE*FLOAT(I)
000121 IF(YTEST .GT. YMAX) YMAX=YTEST
000122 10 CONTINUE
000123 17 CONTINUE
000124
000125 SHIFT CLOUD LATERALLY TO ACCOUNT FOR WINDS DURING RISE TO
000126 STABILIZATION TIME IF WINDS ARE NON ZERO AND PRINT
000127 CLOUD TREJECTORY
000128
000129 IF(.NOT. HONO ) GO TO 12
000130 LOAD PROPER CLOUD LISTS
000131 DO 11 J=1,NPOSIT
000132 TC(J)=CX(1,J)
000133 ZR(J)=CX(3,J)
000134 ZT(J)=CX(4,J)
000135 VR(J)=CX(6,J)
000136 VT(J)=CX(7,J)
000137 11 CONTINUE
000138 11 CALL WINDA (ZBRSTZ)
000139 WRITE(ISOOT,3006) (XC(J),YC(J),ZC(J),TC(J),VC(J),J=1,NPOSIT)
000140
000141 INITIALIZE WAFER UPDRIFT INTERPOLATION ARRAYS AND WAFER DATA
000142 ARRAYS
000143 DO 13 KA=1,90
000144 DO 13 KB=1,2
000145 DPX(KB,KA)=0.0
000146 IF(KBI)15,15,14
000147 14 KOPST=KDI
000148 DPSTK=KOPST
000149 GO TO 16
000150 15 KOPST=10
000151 DPSTK=KOPST
000152 GO TO 14
000153 16 CONTINUE
000154
000155 SET PARTICLE SIZE AND WAFER ROUNDS *F IN DEFAULT
000156 IF( NONE .EQ. 0 ) NONE=1
000157 IF( NTWO .LT. NONE ) NTWO=NDSTR
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00611 304* 5420 CONTINUE
00612 305* VLOC=VELTOT
00613 306* CALL WIND B (DX,DY,ROTALT,NH000,CX(3,LT),YMAX,SLOPE)
00614 307* 5425 CONTINUE
00615 308* BOTXY(KTWO,LX)=TOTXY(KONF,LX)+DY
00616 309* BOTXY(KTWO,LY)=TOTXY(KONF,LY)+DY
00617 310* 5450 CONTINUE
00620 311* GO TO(5470,5460),KLAN
00621 312* 5460 CONTINUE
00622 313* TOPXY(KTWO,LX)=XC(LTP)
00623 314* TOPXY(KTWO,LY)=YC(LTP)
00624 315* GO TO 5500
00625 316* 5470 CONTINUE
00626 317* IF(TOPALT(KTWO),LT,2*PRSTZ) GO TO 5475
00630 318* VLOC=VELTOT
00631 319* CALL WIND B (DX,DY,TOPALT,NH000,CX(2,LT),YMAX,SLOPE)
00632 320* 5475 CONTINUE
00633 321* TOPXY(KTWO,LX)=TOTXY(KONF,LX)+DX
00634 322* TOPXY(KTWO,LY)=TOTXY(KONF,LY)+DY
00635 323* 5500 CONTINUE
00637 324* C TOP AND BOTTOM OF WAFER NOW IN POSITION AT END OF TIME STEP
00638 325* C READY FOR DETERMINATION OF INTERIOR STRUCTURE
00639 326* C WHAT IS WAFER PHASE
00640 327* GO TO (5600,5700,5800),KLIK
00641 328* 5600 CONTINUE
00642 329* C WAFER COMPLETELY BELOW CLOUD BOTTOM AT BEGINNING OF TIME STEP,
00643 330* C PROCESS ACCORDINGLY- TOP AND BOTTOM RADII ALREADY SET
00644 331* C
00645 332* C CALCULATE ALTITUDE EXPANSION FACTOR-AEF
00646 333* C
00647 334* C AEF=(TOPALT(KTWO)-BOTALT(KTWO))/( TOPALT(KONE)-BOTALT(KONE) )
00648 335* 5610 ALTMD(1,KTWO)=ROTALT(KTWO)
00649 336* ALTMD(NLAMNA,KTWO)=TOPALT(KTWO)
00650 337* RADIUS(1,KTWO)=RADIUS(1,KONE)
00651 338* RADIUS(NLAMNA,KTWO)=RADIUS(NLAMNA,KONE)
00652 339* DO 5650 LK=2, NSURF
00653 340* ALTMD(LK,KTWO) =ALTMD(1,KTWO)+
00654 341* 1 AEF*(ALTMD(LK,KONF)-ALTMD(1,KONE))
00655 342* RADIUS(LK,KTWO)=RADIUS(LK,KONF)
00656 343* 5650 CONTINUE
00657 344* GO TO 7000
00658 345* 5700 CONTINUE
00659 346* C
00660 347* C WAFER TOP IN CLOUD AND BOTTOM BELOW CLOUD AT BEGINNING OF
00661 348* C TIME STEP.
00662 349* C
00663 350* C CALCULATE EXPANSION FACTOR FOR PART OF WAFER REMAINING IN CLOUD.
00664 351* ALTMD(NLAMNA,KTWO)=TOPALT(KTWO)
00665 352* AEFCE ( CX(4,LTP)-CX(3,LTP) ) / ( CX(4,LT)-CX(3,LT) )
00666 353* DO 5710 LK=LAMREP,NLAMNA
00667 354* ALTMD(LK,KTWO)=ALTMD(NLAMNA,KTWO)-AEFCE *
00668 355* 1 (ALTMD(NLAMNA,KONF)-ALTMD(LK,KONF) )
00669 356* IF(ALTMD(LK,KTWO).GT.CX(3,LTP) ) GO TO 5700
00670 357* LAMNA HAS FALLEN THROUGH BOTTOM OF CLOUD IN THIS STEP.
00671 358* C CALCULATE RADIUS AT TIME OF EXIT AND UPDATE COUNTERS
00672 359* C
00673 360* C TFACT=(ALTMD(LK,KONE)-CX(3,LT)) /

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00742 41R*
00743 419*
00744 420*
00745 421*
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00747 423*
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00794 470*
00795 471*
00796 472*
00797 473*
00798 474*

C 7000 CONTINUE
      KTIM=LTIM+1
      LAMHLD(KTIM)=LAMRE
      ROTCOR(1,KTIM)=ROTX(KTWO,LX)
      ROTCOR(2,KTIM)=ROTX(KTWO,LX)
      TOPCOR(1,KTIM)=TOPXY(KTWO,LX)
      TOPCOR(2,KTIM)=TOPXY(KTWO,LX)
      DO 7010 LK=1,NLAMNA
        ALTHLD(LK,KTIM)=ALTMID(LK,KTWO)
        RADHLD(LK,KTIM)=RADIUS(LK,KTWO)
      7010 CONTINUE
C
C NOW INTERCHANGE WAFER ARRAY INDICES TO PREPARE SPACE FOR STORAGE
C OF DATA AT NEW TIME AND GO TO NEXT TIME STEP.
C
      KSAVE=KONE
      KONE=KTWO
      KTWO=KSAVE
      IF(ALTHLD(NLAMNA,KTIM).LE. ZRRSTZ) GO TO 4998
      END OF TIME LOOP IS HERE
C 4999 CONTINUE
      4998 CONTINUE
C
      IF(.NOT. PSCSUB) GO TO 5010
      IF( KTIM,NE. WCX ) GO TO 5010
      IF( ALTHLD(1,WCX) .GE. CX(3,WCX) ) PSCSUB= .FALSE.
C
C UNLOAD WAFER HISTORY ARRAYS ONTO OUTPUT TAPE
C
      5010 IF(IC(5) .NE. 0 ) GO TO 5011
      WRITE(IRISE) NLAMNA,LPSC,SURWAM,KTIM,LWAF,LWAF
      WRITE(IRISE)
      1 ( LAMHLD(LK),ROTCOR(1,LK),ROTCOR(2,LK),TOPCOR(1,LK),
      2 TOPCOR(2,LK), ( ALTHLD(LJ,LK),RADHLD(LJ,LK), LJ=1,NLAMNA),
      3 LK=1,KTIM)
C
C DEBUG PRINT OF COMPLETE WAFER HISTORY IF IC(6)=1
C 5011 CONTINUE
C
      IF( IC(6) .EQ. 0 ) GO TO 5831
      WRITE(ISOUT,3010) LPSC,LWAF,SURWAM,(LAMHLD(LK),LK=1,KTIM )
      IF( .NOT. HODO ) GO TO 5830
      WRITE(ISOUT,3012) (ROTCOR(1,LK),ROTCOR(2,LK),TOPCOR(1,LK),
      1 TOPCOR(2,LK), LK=1,KTIM)
      5830 CONTINUE
      WRITE(ISOUT,3011)((ALTHLD(LJ,LK),RADHLD(LJ,LK),LJ=1,NLAMNA),
      1 LK=1,KTIM )
      3010 FORMAT(1H1,5X,5HLPSC=,15,5X,5HLWAF=,15,5X,7HSURWAM=,15,A/
      1 40(1X,12))
      3011 FORMAT(//,(1X,12E10,3))
      3012 FORMAT(// 4(5X,E15.6))
      5831 CONTINUE
      IF( NREKOW .NE. 0) GO TO 6000
C
C END OF WAFER LOOP IS HERE
C 5999 CONTINUE
      5999 CONTINUE

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01110	471*	C	END OF PARTICLE SIZE LOOP IS HERE
01110	472*	C	
01112	477*	C	5009 CONTINUE
01112	478*	C	
01112	479*	C	THIS IS THE END OF THE TAPE
01112	480*	C	
01114	481*	C	WRITE(IRISE) NFAKE,NFAKE,SUBWAM,NFAKE,NFAKE,NFAKE
01114	482*	C	
01124	483*		END FILE IRISE
01125	484*		REWIND IRISE
01126	485*		RETURN
01127	486*		END

END OF COMPILATION: NO DIAGNOSTICS.

0:FOR:5 CASSANDRA.CHI:R  
FOR 50E3-00/11/76-10:10:36 (1,)

SUBROUTINE SHWINO ENTRY POINT 000111

STORAGE USED: 000117 DATA(0) 000063; BLANK COMMON(2) 000000

COMMON, LOCUS:

0003 SET1 002323

EXTERNAL REFERENCES (BLOCK, NAME)

0004 URNU\$  
0005 NI02\$  
0006 NH00\$  
0007 NI01\$  
0010 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000	000013	1F	0001	000031	120G	0001	000053	133G	0001	000047	14	G	0000	00001	2F	
0001	000017	200L	0000	000016	3F	0001	000076	300L	0000	000043	4F		0000	00002	5F	
0003	000000	CAY	0003	000001	DETID	0003	000015	DIAM	0000	000326	DMEAN		0000	000327	DNS	
0003	000330	EXPO	0003	000331	FMASS	0003	000170	HEIGHT	0000	000641	IDISTR		0000	000642	TEXFC	
0000	000051	INJPS	0003	000643	IRISE	0003	I	000644	ISIN	0000	000645	ISOUT	0000	I	000000	J
0000	I	000001	NH000	0003	000646	NDSTR	0003	I	000172	NH000	0000	000647	PS	0000	001167	SD
0003	001160	SSAM	0003	001161	TWF	0003	001162	TMPI	0000	0000	001163	TWP2	0000	001164	T2M	
0003	001165	USOIL	0003	001166	VPR	0003	R	001503	VX	0000	R	002013	VY	0000	001167	W
0003	001171	ZSCL	0003	R	001173	ZV										

00101	1*																
00101	2*	C															
00101	3*	C															
00101	4*	C															
00103	5*																
00103	6*																
00103	7*																
00103	8*																
00103	9*																
00103	10*																
00104	11*																
00107	12*																
00112	13*																
00114	14*																
00115	15*																
00116	16*																
00126	17*																
00131	18*																
00131	19*																

00131	20*	ZV(J) IS INPUT AS THE ALTITUDE OF THE BASE OF THE JTH WIND LEVEL. SHWIND020	000044
00131	21*	IT IS CONVERTED HERE TO THE CENTER ALTITUDE OF THE JTH WIND LEVEL. SHWIND021	000044
00131	22*		000044
00141	23*	WHOD00=NHOD0-1	000060
00142	24*	DO 250 J=1,WHOD0	000060
00145	25*	ZV(J)=(ZV(J)+ZV(J+1))/2.0	000067
00147	26*	ZV(NHOD0)=1.0ER	000074
00150	27*	1 FORMAT(I5)	000074
00151	28*	2 FORMAT(3E13.6)	000074
00152	29*	3 FORMAT(11,9X,WIND HODOGRAPH AT GROUND ZERO,10X,WHOD0 = ,15//1SHWIND029	000074
00152	30*	11X,VECTOR ALTITUDE, ZV(J),16X,VX(J),24X,VY(J),)	000074
00153	31*	4 FORMAT(3(16X,E13.6))	000074
00154	32*	300 RETURN	000074
00155	33*	END	000114

END OF COMPT. ATION: NO DIAGNOSTICS.

3:FOR+S CASSANDRA.TEMP.R  
FOR 50E3-06/11/76-10:15:39 (1)

SUBROUTINE TEMP ENTRY POINT 000066

STORAGE USED: CODE(1) 000070; DATA(0) 000024; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SET1 002323

EXTERNAL REFERENCES (BLOCK, NAME)

0004 XPRR  
0005 ALOG10  
0006 NERR35

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000 R 000001 A	0000 R 000002 B	0003 000000 CAY	0003 000001 DTID	0003 000012 DIAM
0003 000326 DMEAN	0003 000327 DNS	0003 000330 EXPO	0003 000331 FMASS	0003 001170 HEIGHT
0003 000641 IDISTR	0003 000642 IEXEC	0003 000016 INJPS	0003 000643 IRISE	0003 000644 ISIN
0003 000645 ISOUT	0003 000646 NDSTR	0003 001172 NHODO	0003 000647 PS	0000 R 000000 Q
0003 001157 SO	0003 001160 SSAM	0003 R 001161 TME	0003 R 001162 TMP1	0003 R 001163 TMP2
0003 R 001164 T2M	0003 001165 USOIL	0003 001166 VPR	0003 001503 VX	0003 002013 VY
0003 R 001167 W	0003 R 001171 ZSCL	0003 001173 ZV		

00101	1*	C	SUBROUTINE TEMP	TEMP 001	000000
00101	2*	C		TEMP 002	000000
00101	3*	C		TEMP 003	000000
00101	4*	C		TEMP 004	000000
00103	5*		COMMON /SET1/	TEMP 005	000000
00103	6*		1CAY ,DETID(12) ,DIAM(201) ,DMEAN	TEMP 006	000000
00103	7*		2FMASS(200) ,IDISTR ,IEXEC ,IRISE	TEMP 007	000000
00103	8*		3NDSTR ,PS(200) ,SO ,SSAM	TEMP 008	000000
00103	9*		4TMP2 ,T2M ,USOIL ,VPR	TEMP 009	000000
00103	10*		5ZSCL ,NHODO ,ZV(200) ,VX(200) ,VY(200)	TEMP 010	000000
00103	11*	C		TEMP 011	000000
00103	12*	C		TEMP 012	000000
00103	13*	C		TEMP 013	000000
00103	14*	C		TEMP 014	000000
00104	15*	C	COMPUTE VAPOR TEMPERATURE	TEMP 015	000000
00104	16*		Q=ZSCL*W**(-.03921)	TEMP 016	000000
00105	17*		A=5980.*((1.145)**(Q/180.))**((W)**(-0.03948+0.02637*Q/180.))	TEMP 017	000000
00106	18*		B=-0.4473*(W**((0.04360)))	TEMP 018	000000
00107	19*		TMP1=A*((TME/T2M)**B)+1500.0	TEMP 019	000000
00107	20*	C		TEMP 020	000000
00107	21*	C	COMPUTE CONDENSED PHASE MATERIAL TEMPERATURE	TEMP 021	000000
00110	22*		TMP2=50.0*ALOG10(W)+1400.0	TEMP 022	000000
00111	23*		RETURN	TEMP 023	000000

00112

Z44

E-1J

END OF COMPUTATION:

NO DIAGNOSTICS.

TEMP 024

000067

119

2:FOR'S CASSAPRA.TPDLR  
FOR 50E3-00/11/76-10:16:45 (.,)

SUBROUTINE TRPL ENTRY POINT 000077

STORAGE USED: COOF(1) 000123; DATA(0) 000021; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003 MFRR35

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000030 1136	0001	000015 24L	0001	000021 26L	0001	000024 40L	0001	000004 48L
0001	000054 54L	0000	000002 INJP5	0000	000001 MA	0000	000000 MA		

00101	1*	SUBROUTINE TRPL (	TRPL 001	000004
00101	2*	1 ARG, NPR, PARA, PARB, VRB)	TRPL 002	000004
00101	3*	C *****	TRPL 003	000004
00101	4*	C *****	TRPL 004	000004
00101	5*	C *****	TRPL 005	000004
00101	6*	C *****	TRPL 006	000004
00101	7*	C *****	TRPL 007	000004
00101	8*	C *****	TRPL 008	000004
00101	9*	C *****	TRPL 009	000004
00101	10*	C *****	TRPL 010	000004
00101	11*	C *****	TRPL 011	000004
00101	12*	C *****	TRPL 012	000004
00101	13*	C *****	TRPL 013	000004
00101	14*	C *****	TRPL 014	000004
00101	15*	C *****	TRPL 015	000004
00103	16*	DIMENSION	TRPL 016	000004
00103	17*	1 PARA (1), PARB (1)	TRPL 017	000004
00103	18*	C *****	TRPL 018	000004
00103	19*	C *****	TRPL 019	000004
00103	20*	C *****	TRPL 020	000004
00103	21*	C *****	TRPL 021	000004
00104	22*	020 IF (ARG - PARA (1)) 022, 022, 040	TRPL 022	000004
00107	23*	022 MR = 1	TRPL 023	000015
00110	24*	024 VRB = PARB (MR)	TRPL 024	000015
00111	25*	026 RETURN	TRPL 025	000021
00112	26*	040 DO 054 MR = 2, NPR	TRPL 026	000030
00115	27*	IF (ARG - PARA (MR)) 048, 044, 054	TRPL 027	000030
00120	28*	044 MR = MA	TRPL 028	000035
00121	29*	GO TO 024	TRPL 029	000037
00122	30*	048 VRB = (ARG - PARA (MR - 1)) * (PARB (MR) - PARB (MR - 1)) /	TRPL 030	000041
00122	31*	1 (PARA (MR) - PARA (MR - 1)) + PARB (MR - 1)	TRPL 031	000041
00123	32*	GO TO 026	TRPL 032	000052
00124	33*	054 CONTINUE	TRPL 033	000057
00126	34*	MR = NPR	TRPL 034	000057

00127 34\* 50 7 024 000061  
00130 34\* END 000122

END OF COMPUTATION: NO DIAGNOSTICS.



00113	24*	GO TO 130	VAPOR026	000015
00113	27*	C	VAPOR027	000015
00113	28*	C	VAPOR028	000015
00113	29*	C	VAPOR029	000015
00114	30*	200	VAPOR030	000017
00117	31*	115	VAPOR031	000022
00120	32*	115	VAPOR032	000030
00121	33*	120	VAPOR033	000032
00122	34*	130	VAPOR034	000034
00123	35*	END	VAPOR035	000044

END OF COMPILATION: NO DIAGNOSTICS.



```

00105 19* DATA PROGRAM/SHWINDA/
00106 20*
00107 21* INITIALIZE
00108 22*
00109 23* COMPUTE CLOUD CENTER AND STEW DRIFT FACTOR ENTRIES IN RISK TABLE
00110 24*
00111 25*
00112 26*
00113 27*
00114 28*
00115 29*
00116 30*
00117 31*
00118 32*
00119 33*
00120 34*
00121 35*
00122 36*
00123 37*
00124 38*
00125 39*
00126 40*
00127 41*
00128 42*
00129 43*
00130 44*
00131 45*
00132 46*
00133 47*
00134 48*
00135 49*
00136 50*
00137 51*
00138 52*
00139 53*
00140 54*
00141 55*
00142 56*
00143 57*
00144 58*
00145 59*
00146 60*
00147 61*
00148 62*
00149 63*
00150 64*
00151 65*
00152 66*
00153 67*
00154 68*
00155 69*
00156 70*
00157 71*
00158 72*
00159 73*
00160 74*
00161 75*

10 CONTINUE
25 IF I=1,NPOSIT
   ZC(I) = (ZB(I)+ZT(I))/2.0
   VC(I) = (VB(I)+VT(I))/2.0
25 CONTINUE
   NPOSIT = NPOSIT+1
   NHODD = NHODD-1
C ENSURE THAT WIND VECTORS ARE DEFINED TO ABOVE
C STABILIZED CLOUD BOTTOM ALTITUDE
C IF ((ZV(NHODD)+7V(NHODD))/2.0 .GE. 7B(NPOSIT)) GO TO 2217
26 ERROR=-26
   GO TO 7734
C FIND HODOGRAPH VECTOR ALTITUDE APPROPRIATE FOR INITIAL TIME
2217 J=1
   K=1
28 IF ((ZV(1)-(ZV(J)+ZV(J))/2.0) 35,35,30
30 IF (J-NHODD) 31,32,32
31 J=J+1
   GO TO 28
32 ERROR = -32
   GO TO 7734
C COMPUTE HORIZONTAL DISPLACEMENTS VS. TIME FOR THE CLOUD BOTTOM
C CENTER.
35 XT=TC(1)*VX(J)
   YT=TC(1)*VY(J)
   XC(1)=XT
   YC(1)=YT
   TTEMP=TC(1)
   ZTEMP=ZC(1)
C 122 WHICH IS LOWER, NEXT CLOUD POSIT OR NEXT HODOGRAPH VECTOR
C 122 IF (J.GE.NHODD) GO TO 124
   IF ((ZV(J+1) + ZV(J))/2. -ZC(K+1))/2. 124,124
33 DELT=((ZV(J+1)+ ZV(J))/2. - ZTEMP)/VC(K)
   ZTEMP = (ZV(J+1)+ZV(J))/2.
   TTEMP=TTEMP+DELT
   XT=XT+ VX(J)*DELT
   YT=YT+ VY(J)*DELT
   J=J+1
   GO TO 122
C NEXT CLOUD CELL CENTER IS LOWER
C 124 DELT=TC(K+1)-TTEMP
   TTEMP=TC(K+1)
   ZTEMP=ZC(K+1)

```

00166 76\*  
 00167 77\*  
 00170 78\*  
 00171 79\*  
 00172 80\*  
 00173 81\*  
 00175 82\*  
 00176 83\*  
 00177 84\*  
 00200 85\*

XC(K+1)=XT+VX(J)\*DELT  
 YC(K+1)=YT+VY(J)\*DELT  
 XT=XC(K+1)  
 YT=YC(K+1)  
 K=K+1  
 IF (K.LT. NPOSIT) GO TO 122  
 RETURN  
 -734 CALL ERROR(PROGMM,IPROR,ISOUT)  
 RETURN  
 END

END OF COMPIATION: NO DIAGNOSTICS.

000154  
 000157  
 000163  
 000164  
 000165  
 000170  
 000173  
 000177  
 000203  
 000230

3:FOR.S CASSANDRA.JNDH.R  
FOR SDF3-06/11/76-11:16:55 (..)

SUBROUTINE WINDR ENTRY POINT 000355

STORAGE USED: CODE(1) 000030; DATA(0) 000064; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 SET1 002323  
0004 WAFER 000423

EXTERNAL REFERENCES (BLOCK, NAME)

0005 NFRR35

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000015	10L	0001	000244	1000L	0001	000054	1266	0001	000260	15-L	0001	000157	1566	
0001	000021	20L	0001	000304	200L	0001	000274	2136	0001	000306	300L	0001	000206	38L	
0001	000037	40L	0001	000242	50L	0001	000140	60L	0000	R	000023	ALTX	0000	P	
0000	R	000014	AV	0000	R	000015	RY	0000	R	000022	C	0000	000013	AX	
0000	R	000025	DFLT	0000	R	000010	DELZ	0000	R	000016	RY	0000	000000	CAY	
0003	000327	DNS	0004	000135	DPX	0003	000001	DETD	0003	000015	DIAM	0003	000326	DMEAN	
0000	R	000007	DZV	0003	000330	EXPO	0000	R	000011	DVX	0000	R	000021	DZA	
0000	I	000004	I	0003	000641	IDISTR	0003	000642	IFEC	0000	000033	INJPS	0003	000643	
0003	000644	ISIN	0003	000645	ISOUT	0000	I	000003	ISTR	0000	I	000005	IV	0000	I
0000	I	000017	K	0000	I	000001	KA	0000	I	000002	K9	0000	I	000020	KP
0000	I	000024	KS	0004	I	000001	KTWO	0004	000002	LT	0003	000646	NDSTR	0003	001172
0003	000647	PS	0003	001157	SD	0003	001160	SSAM	0003	001161	TME	0003	001162	TMP1	
0003	001163	TMP2	0003	001164	T2W	0003	001165	USOIL	0000	R	000000	V	0004	R	
0000	R	000026	VFLX	0000	R	000027	VELY	0004	000003	VISCX	0003	001166	VPR	0003	R
0003	R	002013	VY	0003	001167	W	0003	001171	ZSCL	0003	R	001173	ZV	0003	R

00101	1*	SUBROUTINE WINDR	000002
00101	2*	1 (DX,DY,ALITUD,NV,TIME,AXNT,S )	000002
00101	3*		000002
00101	4*	C	000002
00101	5*	C	000002
00101	6*	C	000002
00101	7*	C	000002
00103	8*		000002
00103	9*	COMMON /SET1/	000002
00103	10*	1CAY ,DETD(12) ,DIAM(201) ,DMEAN ,DNS ,FXPO	000002
00103	11*	2FMAS(200),IDISTR ,IEXEC ,IRISE ,ISIN ,TSOUT	000002
00103	12*	3NDSTR ,PS(200) ,SD ,SSAM ,TME ,TMP1	000002
00103	13*	4TMP2 ,T2W ,USOIL ,VPR ,W ,HEIGHT	000002
00103	14*	5ZSCL ,NH000 ,ZV(200) ,VX(200) ,VY(200)	000002
00104	15*	COMMON/WAFER/	000002
00104	16*	1 KONE,KTWO,LT,VISCX(90),DPX(2,90),VELOCE,FR0G	000002
00105		DIMENSION ALITUD(2)	000002

00106	17*	V=ARG(VFLOCF)	000002
00107	1*	IF(VFLOCF.GE. 0.0) GO TO 10	000004
00111	1*	K=K-TWO	000007
00112	2*	K=K+ONE	000011
00113	41*	GO TO 20	000013
00114	2*	10 CONTINUE	000015
00115	23*	K=K+ONE	000015
00116	20*	K=K-TWO	000016
00117	25*	20 CONTINUE	000021
00120	26*	ISTATE=IFIX( (ALITUD(KA)-AXNT) / S )	000021
00121	27*	IF( (ALITUD(KB)-ALITUD(KA)).LE. 100.0) GO TO 150	000030
00123	24*	DY=0.0	000045
00124	20*	DY=0.0	000046
00125	30*	FTUD=FIRST TRUE INCLUSIVE INTERVAL	000054
00130	32*	DO 50 I=ISTAT,NV	000060
00132	33*	IF( ALITUD(KA).GT. ZV(I+1) ) GO TO 50	000063
00133	34*	IV=I	000063
00133	35*	IV=I+1	000064
00134	36*	CALCULATE PARTIAL INTERVAL TRANSPORT	000071
00135	37*	DZV=ZV(IVP)-ZV(IV)	000075
00136	38*	DELZ= ( ALITUD(KA)-ZV(IV) ) / DZV	000100
00137	39*	DVX=VX(IVP)-VX(IV)	000103
00140	40*	DY=VY(IVP)-VY(IV)	000104
00141	41*	AX=VX(IV)+DELZ*DVX	000111
00142	42*	AY=VY(IV)+DELZ*DZY	000115
00144	43*	IF( ALITUD(KB).GT. ZV(IVP) ) GO TO 40	000121
00145	44*	DELZ= (ALITUD(KB)-ZV(IV) ) / DZV	000124
00146	45*	BX=VX(IV)+DELZ*DZX	000130
00147	46*	BY=VY(IV)+DELZ*DZY	000133
00150	47*	DX= (ALITUD(KB)-ALITUD(KA))*(AX+BX)	000136
00151	48*	DY= (ALITUD(KB)-ALITUD(KA))*(AY+BY)	000140
00152	49*	GO TO 1000	000144
00153	50*	60 CONTINUE	000146
00154	51*	DX=(ZV(IVP)-ALITUD(KA))*(AX+VX(IVP))	000150
00155	52*	DY=(ZV(IVP)-ALITUD(KA)) *(AY+VY(IVP))	000157
00160	53*	DO 40 K= IVP,NV	000157
00161	54*	KP=K+1	000163
00162	55*	DZV=ZV(KP)-ZV(K)	000164
00164	56*	IF( ALITUD(KB).LE. ZV(KP) ) GO TO 3A	000173
00165	57*	DX=DY+ DZV*(VX(K)+VX(KP) )	000177
00166	58*	DY=DY+ DZV*(VY(K)+VY(KP) )	000200
00167	59*	GO TO 40	000204
00170	60*	3A CONTINUE	000211
00171	61*	DZAE=ALITUD(KB)-ZV(K)	000213
00172	62*	DELZ=DZAE/ DZV	000220
00173	63*	BX=VX(K)+ DELZ*( VX(KP)-VX(K) )	000222
00174	64*	BY=VY(K)+ DELZ*( VY(KP)-VY(K) )	000231
00175	65*	DX=DY+ DZAE*( VX(K)+BX)	000235
00176	66*	DY=DY+ DZAE*( VY(K)+BY)	000240
00177	67*	GO TO 1000	000240
00201	68*	40 CONTINUE	000244
00202	69*	GO TO 1000	000244
00204	70*	50 CONTINUE	000251
00205	71*	.000 C=2.0*V	000250
00206	72*	DX= DX/C	
00207	73*	DY= DY/C	
		RETURN	

```

00210 74* I=0 CONTINUE
00211 75* ALX=(ALITU(KA)*ALITU(KB))/2.0
00212 76* DO 200 K=ISTART,NV
00215 77* IF (ALX.GT. ZV(K+1)) GO TO 200
00217 78* K5=K
00220 79* GO TO 300
00221 80* 200 CONTINUE
00223 81* 300 CONTINUE
00224 82* DELT=(ALTX-7V(KS))/(7V(KS+1)-7V(KS))
00225 83* VELX=VX(KS)+DELT*( VX(KS+1)-VX(KS))
00226 84* VELV=VY(KS)+DELT*( VY(KS+1)-VY(KS))
00227 85* DX=VELX*TIME
00230 86* DY=VELY*TIME
00231 87* RETURN
00232 88* END

```

END OF C\_MPT, ATION: NO DIAGNOSTICS.

#### IV. USER'S GUIDE TO CASSANDRA

##### A. Control Cards for UNIVAC 1108 EXEC 8

The following sequence of control cards are input for a CASSANDRA run on UNIVAC 1108 EXEC 8:

1. @ RUN RUN-ID,ACCT-ID,PROJ-ID,10,200
2. @ ASG,A CASSANDRA.
3. @ ASG,T 8.,F//POS/10
4. @ XQT CASSANDRA.M3DUST  
Insert data deck here for initial conditions, cloud rise, and transport.
5. @ XQT CASSANDRA.MPDQ  
Insert data deck here for CASSANDRA output.
6. Blank card following last data card.
7. @ FIN

##### B. Data Deck for Execution of CASSANDRA. M3DUST

###### 1. Deck 1 - Initial Conditions

<u>Card Sequence</u>	<u>Mnemonic</u>	<u>Format</u>	<u>Read In</u>
Card 1, File Assignments	NUMTAP(I), I=1,15	1514	MTHRE

where:

NUMTAP(1)=ISIN  
 NUMTAP(2)=ISOUT  
 NUMTAP(3)=IRISE  
 and ISIN=Card Reader, set to 5  
 ISOUT=Printer, set to 6  
 IRISE=Drum assignment, set to 8, the same as the control card assignment.

Card 2	LGO,LTHRU	212	MTHRE
--------	-----------	-----	-------

where:

LGO = Start point, punch 1 in column 2.  
 LTHRU = Stop point, punch 2 in column 4.

Card 3	DETID(J), J=1,12	12A6	LINK 1
--------	------------------	------	--------

where:

DETID(J) = Arbitrary 72 character identification table for the initial conditions. It will be printed as it appears on the card.

Card 4                      N                      I5                      LINK 1

where:                      N = The number of data sets for which initial  
condition calculations are desired. If zero  
or negative, 1 is assumed.

Card 5                      IDISTR                      I5                      LINK 1

where:                      IDISTR = Preshot soil size - frequency option  
parameter with values as follows:

IDISTR	PARTICLE SIZE DISTRIBUTION
≤1	Log Normal
2	Power Law
3	Tabular

Card 6                      NDSTR                      I5                      LINK 1

where:                      NDSTR = Number of entries in the soil particle  
size-frequency distribution. This has  
a maximum value of 200 and is set to 100  
if not specified.

The following card order is controlled by the value of IDISTR

For IDISTR ≤1

Card 7                      W,HEIGHT,USOIL,DMEAN,. 7F10.3                      LINK 1  
SD,DNS,HEW

For IDISTR = 2

Card 7                      W,HEIGHT,USOIL,EXPO, 7F10.3                      LINK 1  
CAY,DNS,HEW

Card 8 thru                      A(I),Y(I),I=1,NSEG 2E10.4                      DSTBN  
CAY + 8

For IDISTR = 3

Card 7                      W,HEIGHT,USOIL,DNS, 7F10.3                      LINK 1  
HEW

Card 8 thru                      FMASS(I),DIAM(I), 2E12.5                      LINK 1  
NDSTR + 8                      I=1,NDSTR

Card NDSTR + 9                      DIAM(NDSTR + 1)                      E12.5                      LINK 1

where:                      W = Total weapon yield in kt.

HEIGHT = Height of burst in metres. May be negative for depth of burst.

USOIL = Indicator for soil type.

USOIL = 0. for siliceous.  
USOIL = 1. for calcareous.

DMEAN = Mean diameter of the smallest particle size class to be used.

EXPO = Exponent of the frequency function for the power law particle size frequency distribution.

CAY = Coefficient of the frequency function for the power law particle size frequency distribution.

SD = The standard deviation of the log-normal preshot particle size frequency distribution.

DNS = Fallout particle density ( $\text{g cm}^{-3}$ ). Defaults to 2.6.

HEW = High explosive yield if non-nuclear.

A = Diameter (microns) of particles from the power law particle size distribution curve.

Y = The percent finer by weight a particle size from the power law particle size distribution curve.

NSEG = IFIX (CAY).

FMASS = Fraction of the total particulate mass in the ith particle size class.

DIAM = Diameter of the largest particle in the ith particle size class. DIAM (NDSTR + 1) is the diameter of the smallest particle in the last (smallest) particle size class.

## 2. Deck 2 - GZ Wind Data

<u>Card Sequence</u>	<u>Mnemonic</u>	<u>Format</u>	<u>Read In</u>
Card 1	NHODO	I5	SHWIND

where:

NHODO = Number of wind levels in wind data deck. If  
NHODO = 0 no shot-time winds have been  
specified.

If NHODO > 0

Card 2                    ZV(J),VX(J),VY(J),            3E13.6            SHWIND  
                          J=1,NHODO

where:

ZV = Height of the jth wind stratum.  
VX = X component of the wind velocity of the jth  
     stratum (m/s).  
VY = Y component of the wind velocity of the jth  
     stratum (m/s).

3. Deck 3 - LINK 2 Input

<u>Card Sequence</u>	<u>Mnemonic</u>	<u>Format</u>	<u>Read In</u>
Card 1	DNID	12A6	LINK 2
Card 2	KDI,IRAD,KCLD, KRX,IPAM,KATM	6I4	LINK 2
Card 3	ZBRSTZ	E12.5	LINK 2
Card 4	SLDTMP	E12.5	LINK 2
Card 5	FW	E12.5	LINK 2
Card 6	PHI	E12.5	LINK 2
Card 7	ATID	12A6	LINK 2

where:

DNID = Arbitrary cloud-rise module identification.  
KDI = The number of deposit increments per particle  
     size class.  
IRAD = Number of cloud wafer radius subdivisions.  
KCLD = Control Index for CRM debug printout.  
     KCLD = 1, print data from CRM.  
     KCLD = 0, no debug printout.  
KRX = Control Index for REXP debug printout  
     KRX = 0, no printout, KRX = 1, print debug  
     data from REXP.  
IPAM = Particle activity calculation control  
     (always zero).  
KATM = Atmosphere printout switch.  
     KATM = 0, no printout from ATMR.  
     KATM = 1, print complete atmosphere.  
ZBRSTZ = Altitude of GZ (metres above MSL).  
SLDTMP = Particle solidification temperature (°K).  
FW = Fission yield (kt).  
PHI = Fraction of FW used to heat air internally.  
ATID = An arbitrary 72 character identification  
     for the atmosphere.

Card 8                    FMT                    12A6                    ATMR

where:

FMT = Atmosphere data are read  
by the format specified on the FMT card. The  
eight values are then scaled by the data on  
the SCALE card and are taken to be in the  
order specified on the N1---N8 card.

Cards 9 & 10	SCALE(I), I=1,10	7F10.5/3F10.5	ATMR
Card 11	N1 - N8	8I4	ATMR

where:

N1 -- N8 = Atmosphere data sequence indices.

Card 12	NPVA	I4	ATMR
---------	------	----	------

where:

NPVA = Number of atmosphere table entries.

Card 13 to NPVA+11	AP(I), I=1,8	FMT	ATMR
--------------------	--------------	-----	------

where:

AP = Atmosphere data. The data required are:

ALT = Altitude of the ith level above MSL(metres).  
ATP = Temperature of the ith atmosphere level( $^{\circ}$ K).  
PRS = Pressure of the ith atmosphere level(mb).  
RHZ = Atmospheric air density of the ith atmospheric  
level( $\text{kg/m}^3$ ).  
RLH = Relative humidity of the ith atmospheric  
level (percent).  
ETA = Atmospheric dynamic viscosity of the ith  
atmospheric level ( $\text{kg/(m-s)}$ ). Does not have  
to be input.  
GRV = Acceleration due to gravity at the ith  
atmospheric level ( $\text{cm s}^{-2}$ ). Need not be input.  
SLM = Mean-free-path of air molecules at the ith  
atmospheric level (m). Need not be input.

then:

If the data are in the above order, the sequence card would be  
punched 1, 2, 3, 4, 5, 6, 7, 8; however, if not, the proper number  
sequence would be punched and AP(I) is converted as required. For this  
program PRS or RHZ (but not both) need be input.

#### 4. Deck 4 - Input for Cloud Rise and Point Density

<u>Card Sequence</u>	<u>Mnemonic</u>	<u>Format</u>	<u>Read In</u>
Card 1	DETID(J), J=1, 12	12A6	RSXP

where:

DETID = Arbitrary 72 character identification for the cloud rise calculations.

Card 2	IC(J), J=1, 18	18I4	RSXP
--------	----------------	------	------

where:

IC = Control indices. In the current version of CASSANDRA only two of the 18 elements of this control array are in use. These are IC(5) and IC(6). If IC(5) ≠ 0, skips around writing wafer history arrays on IRISE tape. If IC(6) ≠ 0, debug prints complete wafer history.

Card 3	XGZ, YGZ, TGZ	3E12.5	RSXP
--------	---------------	--------	------

where:

XGZ = X - coordinate of ground zero (m).  
 YGZ = Y - coordinate of ground zero (m)  
 TGZ = Time of detonation (s),

Card 4	NSUBD, NONE, NTWO, LWONE, 5I4 LWTWO		RSXP
--------	--	--	------

where:

NSUBD = Below cloud wafer subdivisions. Default value = 5.  
 NONE = Starting particle size increment. Default value = 1.  
 NTWO = Ending particle size increment. Default value = NDSTR.  
 LWONE = Starting wafer bounds. Default value = 1.  
 LWTWO = Ending wafer bounds. Default value = KDPST where KDPST is set depending upon KDI. If KDI > 0, KDPST = KDI. If KDI = 0, KDPST = 10.

This is the end of the data decks required for execution of CASSANDRA. M3DUST.

#### C. Data Deck for Execution of CASSANDRA.MPDQ

The following input data deck is placed following the @XQT CASSANDRA.MPDQ control card.

<u>Card Sequence</u>	<u>Mnemonic</u>	<u>Format</u>	<u>Read In</u>
Card 1	IPDQ	I2	PDQXQT
where:	IPDQ = Logical unit of Cloud Tape (IRISE).		
Card 2	OPTION	I5	PDQXQT
where:	OPTION = Specifies target option to determine type of calculation and times to be used. OPTION = 0 program stops. OPTION = 1 gives tabular output of dust loading at specified target coordinates. OPTION = 2 gives map output of mass concentration at points in space. OPTION = -1 or -2 are used to repeat calculation for a new set of coordinates and time.		
IF OPTION = 1 the following cards are input:			
Cards 3 and 4	NTARP,TX(J),TY(J), TZ(J),TRAT(J),J=1, NTARP	I5/4E15.5	PDQXQT
where:	NTARP = Number of target coordinates for which calculations are to be made. TX = X - coordinate relative to GZ (m). TY = Y - coordinate relative to GZ (m). TZ = Altitude above ground level (m). TRAT = Time after detonation at which calculation is made (s).		
Card 5	COMBIN,ISTART,ISTOP	3I5	PDQXQT
where:	COMBIN = Control number of particle size classes being summed at each target point. If 0, indicates summation of all particle size classes. ISTART = Control number for beginning particle size class to be treated. If 0, ISTART = NONE. ISTOP = Control number for ending particle size class to be treated. If 0, ISTOP = NDSTR.		
Card 6	If blank, program terminates since OPTION = 0. If -1, program repeats if a new data deck for OPTION 1 follows this card.		

IF OPTION = 2, the following cards are input:

Card 3                    NSTRIP,NROW,NANGL            315            PDQXQT

where:

NSTRIP = Control integer for number of map strips  
to be printed.  
NROW = Control integer for number of rows of  
point density data to be printed.  
NANGL = Control integer for angle relative to  
east of GZ.

For example, if NSTRIP = 1, NROW = 2 and NANGL = 0, a map will be  
produced one page wide, with 15 points in X direction and 30 points in  
the Z direction and the angle will be 0° from east.

Card 4                    RMIN,RMAX,ALTMIN            6E12.4            PDQXQT  
                         ALTMAX,DELR,DELALT

where:

RMIN = Minimum distance relative GZ (m).  
RMAX = Maximum distance relative GZ (m).  
ALTMIN = Minimum altitude above ground (m).  
ALTMAX = Maximum altitude above ground (m).  
DELR = Horizontal distance between target points (m).  
DELALT = Vertical distance between target points (m).  
One of the above other than RMIN and ALTMIN must  
be input.

Card 5                    TRAT                    E12.4            PDQXQT

where:

TRAT = Time (s) for matrix target representation,  
seconds after burst.

Card 6                    COMBIN,ISTART,ISTOP            815            PDQXQT

where:

Same as previously discussed

Card 7                    OPTION                    15            PDQXQT

where:

OPTION = 0 program stops.  
OPTION = -2 program repeats for a new time update  
request (Card 5).

## V. EVALUATION OF CASSANDRA

### A. Dial Pack Simulation

The validity of the CASSANDRA code was tested by running a simulation of the dust cloud resulting from the high explosive event Dial Pack.<sup>2</sup> The Dial Pack event was chosen because there was a project for the specific purpose of sampling the dust cloud by aircraft traversal at a number of times and altitudes. The sampling project resulted in calculated values for average mass concentration at various altitudes within the cloud.

In order to simulate the cloud rise dynamics of a high explosive (HE) test with a program specifically designed for modelling nuclear clouds, it was necessary to modify the assumed energy partition. For HE, all of the energy was assumed to heat the cloud. Figure 4 shows the cloud top altitude as a function of time, calculated by CASSANDRA, together with some observed values for the Dial Pack cloud. Considering the irregular nature of the Dial Pack cloud, this is considered to be in fair agreement.

The particle size distribution used to characterize the preshot soil is shown in Figure 5. It is a continuous piecewise power law distribution and was constructed to fit the data points shown. The crosses represent data obtained from the analysis of a core sample of preshot soil. This particular core sample was chosen because the particle size range compared favorably with that found in the samples from the aircraft traversals and from ground based collectors. The size range used was from 0.012 to 2000 microns.

Due to the lack of shot time wind information for Dial Pack and the fact that the average wind changed direction by about 180° shortly before detonation, the simulation was run with zero wind. Since the figures for comparison are averages over a cloud traversal at a fixed altitude, this is not considered a serious drawback.

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2. Hyman, David S., et al, "Dust Cloud Analysis for Event Dial Pack", DASA 2694, Headquarters, Defense Atomic Support Agency, Washington, DC 20305, May 71.

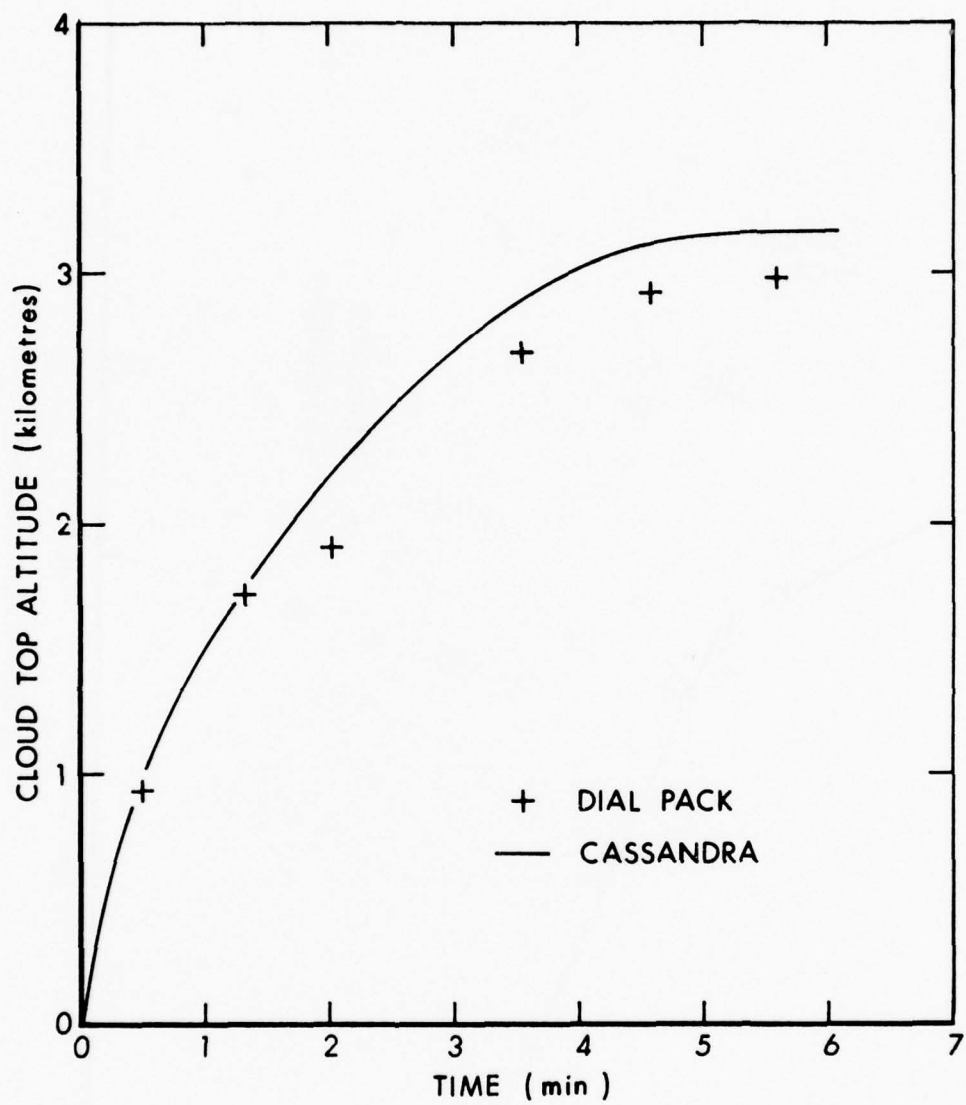


Figure 4. Cloud Rise

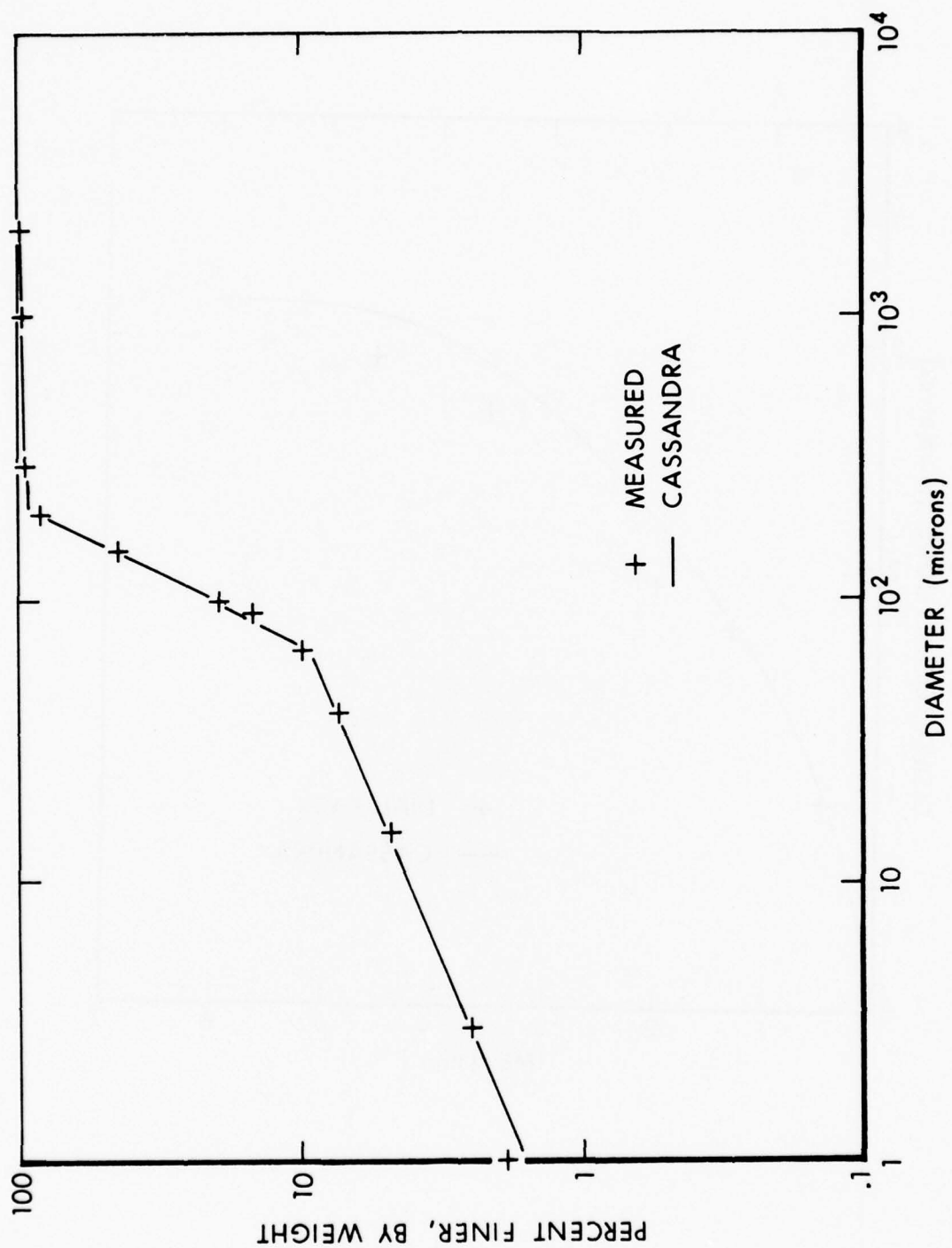


Figure 5. Dial Pack Particle Size Distribution

B. Sample Data Deck for Dial Pack Simulation

001	DASG.A CASSANDRA.											NUMTAP	
002	DASG.T R.F//POS/10											LG0	
003	DXOT CASSANDRA.M3DUST											DETD	
004	5	6	8	15	16	20	21	22	17	18	11	12	N
005	1	2										INDSTR	
006													NDSTR
007													WHUE
008	2												A(1)Y(1)
009	100												A(2)Y(2)
010	1.0			4.1			2.0			-4.0	1.6		A(3)Y(3)
011	2000.0			100.0									A(4)Y(4)
012	215.0			95.0									NH000
013	69.0			9.5									DNTO
014	1.0			1.6									KOT
015													7PnST7
016													SL0TMP
017	10												FW
018	659.892												PHT
019	1673.0												ATTD
020	0.5												FTM
021	1.0												SCALE1
022	DIAL PACK ATMOSPHERIC DATA												SCALE2
023	(5F10.0,3F2.0)												SEO
024													NPVA
025													ATM 1
026	1	2	3	4	5	6	7	8					ATM 2
027	15											6.0	ATM 3
028			299.2		931.4					52.	ATM 4		
029	784.555		286.9		850.					44.	ATM 5		
030	1552.346		281.1		775.					36.	ATM 6		
031	2326.54		277.5		705.					30.	ATM 7		
032	3128.47		271.1		638.					30.	ATM 8		
033	3918.20		267.7		577.					30.	ATM 9		
034	4722.57		262.5		520.					30.	ATM10		
035	5555.59		256.6		466.					30.	ATM11		
036	6380.38		250.5		417.					30.	ATM12		
037	7246.92		249.5		370.					30.	ATM13		
038	8095.18		236.5		333.					30.	ATM14		
039	9045.05		230.8		258.					30.	ATM15		
040	9240.31		230.0		253.					30.	DETD		
041	10762.18		241.1		220.					30.	IC		
042	11712.55		221.1		190.					30.	XG7,vG7.TG		
043													NSUB
044													IP00
045													OPTTON
046													NTARP
047	DXOT CASSANDRA.MPD0												
048	R												
049	1												
050	5												
051											1000.	1200.	
052											1500.	1200.	
053											2000.	1200.	
054											2500.	1200.	
055											3000.	1200.	
056	10												
057													COMBIN
058													

C. Sample Computer Output for Dial Pack Simulation

THE DEPARTMENT OF DEFENSE FALLOUT PREDICTION SYSTEM

INITIAL CONDITIONS (FIRBALL) MODULE

PREPARED BY  
ARCON CORPORATION  
WAKEFIELD, MASS.

INITIAL CONDITIONS IDENTIFICATION

YIELD  
HEIGHT OF DEPTH OF BURST  
SOIL CATEGORY

INPUT PARAMETERS

.50000+00 KT  
.41000+01 METERS  
CALCAREOUS

PARTICLE SIZE FREQUENCY DISTRIBUTION  
POWER LAW DISTRIBUTION WITH -  
100 PARTICLE SIZE CLASSES  
THE SPECIFIED PARAMETERS ARE  
CAY = .45000+01  
EXPO = .00000

PARTIAL SIZE, LOWER SIZE INTERVAL BOUNDARY, MASS FREQUENCY, AND UPPER SIZE INTERVAL BOUNDARY  
FOR USE IN EXP. TRANSPORT, AND ACTIVITY CALCULATIONS (DIAMETERS IN METERS)

	DIAMETER	LOWER BOUNDARY	MASS FRACTION	UPPER BOUNDARY
1	.16075-03	.12020-02	.10000-01	.20000-02
2	.10361-02	.83087-03	.10000-01	.12920-02
3	.66481-03	.53193-03	.10000-01	.83087-03
4	.42453-03	.33898-03	.10000-01	.53193-03
5	.26398-03	.21500-03	.10000-01	.33898-03
6	.21444-03	.21398-03	.10000-01	.21500-03
7	.21332-03	.21275-03	.10000-01	.21398-03
8	.21219-03	.21162-03	.10000-01	.21275-03
9	.21105-03	.21048-03	.10000-01	.21162-03
10	.20991-03	.20934-03	.10000-01	.21048-03
11	.20876-03	.20819-03	.10000-01	.20934-03
12	.20761-03	.20703-03	.10000-01	.20819-03
13	.20645-03	.20586-03	.10000-01	.20703-03
14	.20528-03	.20469-03	.10000-01	.20586-03
15	.20410-03	.20351-03	.10000-01	.20469-03
16	.20292-03	.20233-03	.10000-01	.20351-03
17	.20173-03	.20114-03	.10000-01	.20233-03
18	.20054-03	.19994-03	.10000-01	.20114-03
19	.19933-03	.19873-03	.10000-01	.19994-03
20	.19812-03	.19752-03	.10000-01	.19873-03
21	.19690-03	.19629-03	.10000-01	.19752-03
22	.19568-03	.19506-03	.10000-01	.19629-03
23	.19444-03	.19382-03	.10000-01	.19506-03
24	.19320-03	.19258-03	.10000-01	.19382-03
25	.19195-03	.19132-03	.10000-01	.19258-03
26	.19069-03	.19006-03	.10000-01	.19132-03
27	.18942-03	.18879-03	.10000-01	.19006-03
28	.18815-03	.18751-03	.10000-01	.18879-03
29	.18686-03	.18622-03	.10000-01	.18751-03
30	.18557-03	.18492-03	.10000-01	.18622-03
31	.18426-03	.18361-03	.10000-01	.18492-03
32	.18295-03	.18229-03	.10000-01	.18361-03
33	.18162-03	.18096-03	.10000-01	.18229-03
34	.18029-03	.17962-03	.10000-01	.18096-03
35	.17895-03	.17827-03	.10000-01	.17962-03
36	.17759-03	.17692-03	.10000-01	.17827-03
37	.17623-03	.17555-03	.10000-01	.17692-03
38	.17485-03	.17416-03	.10000-01	.17555-03
39	.17347-03	.17277-03	.10000-01	.17416-03
40	.17207-03	.17137-03	.10000-01	.17277-03
41	.17066-03	.16995-03	.10000-01	.17137-03
42	.16924-03	.16853-03	.10000-01	.16995-03
43	.16780-03	.16708-03	.10000-01	.16853-03
44	.16636-03	.16563-03	.10000-01	.16708-03
45	.16490-03	.16416-03	.10000-01	.16563-03
46	.16342-03	.16268-03	.10000-01	.16416-03
47	.16194-03	.16119-03	.10000-01	.16268-03
48	.16043-03	.15968-03	.10000-01	.16119-03
49	.15892-03	.15816-03	.10000-01	.15968-03
50	.15739-03	.15662-03	.10000-01	.15816-03
51	.15584-03	.15507-03	.10000-01	.15662-03

52	.1429-03	.1530-03	.1000-01	.1507-03
53	.1527-03	.1519-03	.1000-01	.1530-03
54	.1511-03	.1503-03	.1000-01	.1519-03
55	.1494-03	.1486-03	.1000-01	.1503-03
56	.1476-03	.1468-03	.1000-01	.1486-03
57	.1462-03	.1453-03	.1000-01	.1470-03
58	.1445-03	.1437-03	.1000-01	.1453-03
59	.1428-03	.1420-03	.1000-01	.1437-03
60	.1414-03	.1402-03	.1000-01	.1420-03
61	.1394-03	.1385-03	.1000-01	.1402-03
62	.1376-03	.1367-03	.1000-01	.1385-03
63	.1358-03	.1349-03	.1000-01	.1367-03
64	.1340-03	.1331-03	.1000-01	.1349-03
65	.1322-03	.1313-03	.1000-01	.1331-03
66	.1304-03	.1294-03	.1000-01	.1313-03
67	.1285-03	.1275-03	.1000-01	.1294-03
68	.1266-03	.1256-03	.1000-01	.1275-03
69	.1246-03	.1237-03	.1000-01	.1256-03
70	.1227-03	.1217-03	.1000-01	.1237-03
71	.1207-03	.1197-03	.1000-01	.1217-03
72	.1186-03	.1176-03	.1000-01	.1197-03
73	.1165-03	.1155-03	.1000-01	.1176-03
74	.1144-03	.1134-03	.1000-01	.1155-03
75	.1123-03	.1112-03	.1000-01	.1134-03
76	.1101-03	.1090-03	.1000-01	.1112-03
77	.1078-03	.1067-03	.1000-01	.1090-03
78	.1055-03	.1044-03	.1000-01	.1067-03
79	.1032-03	.1020-03	.1000-01	.1044-03
80	.1008-03	.9963-04	.1000-01	.1020-03
81	.9838-04	.9714-04	.1000-01	.9963-04
82	.9586-04	.9459-04	.1000-01	.9714-04
83	.9326-04	.9195-04	.1000-01	.9459-04
84	.9059-04	.8924-04	.1000-01	.9195-04
85	.8787-04	.8644-04	.1000-01	.8924-04
86	.8499-04	.8355-04	.1000-01	.8644-04
87	.8204-04	.8054-04	.1000-01	.8355-04
88	.7897-04	.7743-04	.1000-01	.8054-04
89	.7579-04	.7417-04	.1000-01	.7743-04
90	.7245-04	.7076-04	.1000-01	.7417-04
91	.6530-04	.6361-04	.1000-01	.7076-04
92	.5272-04	.5096-04	.1000-01	.6361-04
93	.3913-04	.3738-04	.1000-01	.5096-04
94	.2779-04	.2606-04	.1000-01	.3738-04
95	.1863-04	.1696-05	.1000-01	.2606-04
96	.1151-04	.1000-01	.1000-01	.1696-05
97	.6272-05	.4455-05	.1000-01	.1000-01
98	.2751-05	.1696-05	.1000-01	.4455-05
99	.7457-06	.3272-06	.1000-01	.1696-05
100	.6298-07	.1212-07	.1000-01	.3272-06

\*\*\* INITIAL CLOUD PROPERTIES AT H + .1858+01 SECONDS \*\*\*

AVERAGE GAC TEMPERATURE

.24897+0, DEGREES KELVIN

AVERAGE TEMPERATURE OF CONDENSED PHASE MATERIAL IN CLOUD

.13849+04 DEGREES KELVIN

MASS OF VAPORIZED SOIL IN CLOUD	.00000	KILOGRAMS
MASS OF CONDENSED PHASE MATERIAL IN CLOUD	.42266*06	KILOGRAMS
PARTICLE SIZE FREQUENCY DISTRIBUTION AT THE TIME OF INITIAL CONDITIONS SPECIFICATION		

\* \* \* \* \*

CHOT- INC WINDS HAVE NOT BEEN SPECIFIED  
LEAVING LINK 1  
ENTERING LINK 2

# THE DEPARTMENT OF DEFENSE FALLOUT PREDICTION SYSTEM

\*\*\*\*\*  
\*\*\*\*\*

## CLOUD-RISE MODULE

PREPARED BY  
NAVAL RADIOLOGICAL DEFENSE LABORATORY  
S.F., CALIF.  
AND  
ARCON CORPORATION  
WAKEFIELD, MASS.

### CLOUD RISE RUN IDENTIFICATION -

#### ATMOSPHERE IDENTIFICATION -DIAL PACK ATMOSPHERIC DATA

ELEVATION OF GROUND ZERO = 659.9 METERS  
SOIL SOLIDIFICATION TEMPERATURE = 1673.0 DEGREES KELVIN  
PARTICLE DENSITY (C.G.S.) = 1.6000  
YIELDS (KT) =  
TOTAL = -.5000+00 FISSION = .5000+00  
FRACTION OF AVAILABLE ENERGY USED TO HEAT AIR INITIALLY = .1000+01  
FRACTION OF AVAILABLE ENERGY USED TO HEAT LIQUID WATER INITIALLY = .0000

### COMPUTATION CONTROL INPUTS-

NDSTR	INDSTR	KOI	IRAD	KCLD	KRX	IPAM	KATM
100	2	10	0	0	0	0	0

### COMPUTATION CONTROLS -

NUMBER OF PARTICLE SIZE CLASSES REQUESTED = 100  
NUMBER OF CLOUD SUBDIVISIONS(WAFERS) PER SIZE CLASS = 10  
WAFER SUBDIVISION FACTOR = 0

FRACTION OF THE DETONATION ENERGY YIELD IN THE CLOUD AT INITIAL TIME IS .10000+01

CLOUD RISE IS TERMINATED IN CYPN AT STATEMENT 243 BY THE R RATE SWITCH

CLOUD RISE AND EXPANSION HISTORY TABLE CX

CLOUD HISTORY TABLE

	CLOUD TIME (SEC)	CLOUD INTERVAL (SEC)	CLOUD BASE (M)	CLOUD TOP (M)	CLOUD RADIUS (M)	BASE RATE (M/SEC)	TOP RATE (M/SEC)	RADIAL RATE (M/SEC)	TEMPERATURE (K)	CAS SENSITIVITY (KG/M**3)
1)	1.4586+00	1.4750-01	6.6896+02	8.2861+02	1.2068+02	1.3764+02	1.6290+02	2.3795+01	2.4897+01	1.1909-01
2)	2.0461+00	4.3750-01	6.9477+02	8.5915+02	1.2514+02	9.7710+01	1.1565+02	3.4211+01	1.9081+01	1.5487-01
3)	2.4836+00	8.7500-01	7.3752+02	9.0975+02	1.4011+02	5.3614+01	6.3456+01	3.0248+01	1.1402+01	2.5582-01
4)	3.3586+00	1.5000+00	7.8443+02	9.6527+02	1.6074+02	3.0674+01	3.6305+01	1.9158+01	7.1803+01	4.0700-01
5)	4.4858+00	1.5000+00	8.3044+02	1.0197+03	1.9531+02	2.3246+01	2.7514+01	1.4017+01	5.2193+02	5.5667-01
6)	6.3586+00	2.5000+00	8.6531+02	1.0610+03	2.1634+02	2.0581+01	2.4359+01	1.0022+01	4.5159+02	6.4051-01
7)	8.4586+00	3.0000+00	9.1676+02	1.1219+03	2.4364+02	1.9468+01	2.7042+01	8.6850+00	3.9822+02	7.2150-01
8)	1.1659+01	3.5000+00	9.7517+02	1.1910+03	2.6970+02	1.9022+01	2.2514+01	7.2711+00	3.6706+02	7.7696-01
9)	1.5359+01	4.5000+00	1.0417+03	1.2698+03	2.9515+02	1.8655+01	2.2080+01	6.3000+00	3.4655+02	8.1581-01
10)	1.9859+01	5.5000+00	1.1257+03	1.3692+03	3.2359+02	1.8132+01	2.1460+01	5.6663+00	3.3052+02	8.4595-01
11)	2.5359+01	6.5000+00	1.2254+03	1.4872+03	3.5475+02	1.7384+01	2.0575+01	5.2016+00	3.1815+02	8.6721-01
12)	3.1859+01	9.0000+00	1.3384+03	1.6210+03	3.8856+02	1.6372+01	1.9377+01	4.8558+00	3.0859+02	8.8111-01
13)	3.9859+01	8.5000+00	1.4694+03	1.7760+03	4.2741+02	1.5205+01	1.7996+01	4.5818+00	3.0081+02	8.8890-01
14)	4.8359+01	1.0000+01	1.5986+03	1.9289+03	4.6636+02	1.3991+01	1.6560+01	4.3340+00	2.9519+02	8.9070-01
15)	5.8359+01	1.1500+01	1.7385+03	2.0945+03	5.0970+02	1.2739+01	1.5078+01	4.0896+00	2.9055+02	8.8829-01
16)	6.9859+01	1.3000+01	1.8850+03	2.2679+03	5.5673+02	1.1497+01	1.3607+01	3.8420+00	2.8674+02	8.8241-01
17)	8.2859+01	1.4500+01	2.0345+03	2.4448+03	6.0667+02	1.0331+01	1.2227+01	3.5796+00	2.8360+02	8.7430-01
18)	9.7359+01	1.9500+01	2.1843+03	2.6221+03	6.5858+02	9.2080+00	1.0898+01	3.3283+00	2.8092+02	8.6561-01
19)	1.1686+02	1.5000+01	2.3638+03	2.8346+03	7.2348+02	8.2812+00	9.8015+00	3.1153+00	2.7812+02	8.5368-01
20)	1.3186+02	2.0000+01	2.4881+03	2.9817+03	7.7021+02	7.4854+00	8.8595+00	2.9378+00	2.7638+02	8.4324-01
21)	1.5186+02	2.5000+01	2.6378+03	3.1589+03	8.2896+02	6.5795+00	7.7873+00	2.7368+00	2.7443+02	8.3324-01
22)	1.7686+02	2.0000+01	2.8023+03	3.3535+03	8.9738+02	5.6306+00	6.6643+00	2.5800+00	2.7244+02	8.2061-01
23)	1.9686+02	2.5000+01	2.9149+03	3.4868+03	9.4898+02	4.5414+00	5.3751+00	2.4821+00	2.7119+02	8.1213-01
24)	2.2186+02	3.0000+01	3.0284+03	3.6212+03	1.0110+03	3.1588+00	3.7386+00	2.3925+00	2.7002+02	8.0321-01
25)	2.5186+02	3.0000+01	3.1232+03	3.7334+03	1.0828+03	1.7190+00	2.0345+00	2.3259+00	2.6913+02	7.8544-01
26)	2.8186+02	3.0000+01	3.1747+03	3.7944+03	1.1526+03	4.6157-01	5.4631-01	2.2051+00	2.6872+02	7.8102-01
27)	3.1186+02	3.5000+01	3.1886+03	3.8108+03	1.2214+03	2.1720-03	-2.1720-03	2.1867+00	2.6869+02	7.8959-01
28)	3.4686+02	3.5000+01	3.1887+03	3.8107+03	1.2980+03	0.0000	0.0000	2.0178+00	2.6882+02	7.8936-01
29)	3.8186+02	4.0000+01	3.1887+03	3.8107+03	1.3686+03	0.0000	0.0000	1.8745+00	2.6891+02	7.8912-01
30)	4.2186+02	4.5000+01	3.1887+03	3.8107+03	1.4436+03	0.0000	0.0000	1.7416+00	2.6899+02	7.8891-01
31)	4.6686+02	4.5000+01	3.1887+03	3.8107+03	1.5220+03	0.0000	0.0000	1.6255+00	2.6906+02	7.8871-01
32)	5.1186+02	4.5000+01	3.1887+03	3.8107+03	1.5951+03	0.0000	0.0000	1.5282+00	2.6912+02	7.8858-01
33)	5.5686+02	5.0000+01	3.1887+03	3.8107+03	1.6639+03	0.0000	0.0000	1.4412+00	2.6916+02	7.8845-01
34)	6.0686+02	0.0000	3.1887+03	3.8107+03	1.7359+03	0.0000	0.0000	0.0000	2.6921+02	7.8834-01

TIME OF SOIL SOLIDIFICATION = 2.1817 SEC

\*\*\*\*\*  
 THE DEPARTMENT OF DEFENSE FALLOUT PREDICTION SYSTEM  
 \*\*\*\*\*

CLOUD RISE - POINT DENSITY CALCULATIONS

FW	SSAM	SLOTWP	TUSD	SIGMA
.50000+00	.422662+05	.167300+04	.218168+01	.000000
W	HOB	RFD		
.50000+00	.410000+01	.160000+04		

DFTID  
 DIAL PACK TEST

CONTROL ARRAY IC(J),J=1,18  
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

DFTONATION COORDINATES  
 XGZ YGZ TGZ  
 .000000 .000000 .000000

NSUBD= 5

QXQT CASSANDRA.MPOQ  
 OPTION 1

TARGET COORDINATES  
VALUES RELATIVE TO GZ

NO.	X	Y	Z	T					
1.	.0000	.0000	.1000+04	1304.0					
2	.0000	.0000	.8000+03	1304.0					
3	.0000	.0000	.6000+03	1304.0					
4	.0000	.0000	.4000+03	1304.0					
5	.0000	.0000	.2000+03	1304.0					
10	ICRT	1 ICST	100						
PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 209.34 TO 2000.00 MICRONS									
1	.3114+01	2	.5161+01	3	.5594+01	4	.0813+01	5	.2437+00

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 197.52 TO 209.34 MICRONS

1	.7552+01	2	.1697+02	3	.0000	4	.0000	5	.0000
---	----------	---	----------	---	-------	---	-------	---	-------

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 184.92 TO 197.52 MICRONS

1	.1558+02	2	.0000	3	.0000	4	.0000	5	.0000
---	----------	---	-------	---	-------	---	-------	---	-------

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 171.37 TO 184.92 MICRONS

1	.4913+01	2	.0000	3	.0000	4	.0000	5	.0000
---	----------	---	-------	---	-------	---	-------	---	-------

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 156.62 TO 171.37 MICRONS

1	.0000	2	.0000	3	.0000	4	.0000	5	.0000
---	-------	---	-------	---	-------	---	-------	---	-------

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 140.29 TO 156.62 MICRONS

1	.0000	2	.0000	3	.0000	4	.0000	5	.0000
---	-------	---	-------	---	-------	---	-------	---	-------

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 121.72 TO 140.29 MICRONS

1	.0000	2	.0000	3	.0000	4	.0000	5	.0000
---	-------	---	-------	---	-------	---	-------	---	-------

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 99.64 TO 121.72 MICRONS

1	.0000	2	.0000	3	.0000	4	.0000	5	.0000
---	-------	---	-------	---	-------	---	-------	---	-------

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS 70.77 TO 99.64 MICRONS

1	.0000	2	.0000	3	.0000	4	.0000	5	.0000
---	-------	---	-------	---	-------	---	-------	---	-------

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS .01 TO 70.77 MICRONS

1	.0000	2	.0000	3	.0000	4	.0000	5	.0000
---	-------	---	-------	---	-------	---	-------	---	-------

OPTION 2  
A MATRIX TARGET REPRESENTATION HAS BEEN CHOSEN WITH THE FOLLOWING PARAMETERS

STRIPS= 1 ROWS= 2 ANGLE IS 0 DEGREES FROM EAST

MINIMUM DISTANCE IS	.00000	MAXIMUM DISTANCE IS	.18538+04
MINIMUM ALTITUDE IS	.00000	MAXIMUM ALTITUDE IS	.32000+04
HORIZONTAL DISTANCE BETWEEN TARGET POINTS IS	.13241+03		
VERTICAL DISTANCE BETWEEN TARGET POINTS IS	.11034+03		

X	Y	X	Y
.0000	.0000	.1324+03	.0000
.3972+03	.0000	.5297+03	.0000
.7945+03	.0000	.9269+03	.0000
.1192+04	.0000	.1324+04	.0000
.1569+04	.0000	.1721+04	.0000
		.2648+04	.0000
		.6821+04	.0000
		.1059+04	.0000
		.1457+04	.0000
		.1854+04	.0000

ALTITUDES

3200.0	4000.7	2970.3	2869.0	2758.6	2648.3	2537.9	2317.2	2206.9
2000.6	1900.2	1875.9	1765.5	1655.2	1544.8	1434.5	1213.9	1103.4
900.1	802.8	772.4	662.1	551.7	441.4	331.0	220.7	110.3

TIME OF FOLLOWING MAP TO 1304.0 SECONDS  
COMBIN 100 ISTART 1 ISTOP 100

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS .01 TO 2000.00 MICRONS





OPTION -2

TIME OF FOLLOWING MAP IS 1500.0 SECONDS  
COMBIN 100 ISTART 1 ISTOP 100

PARTICLE SIZE RANGE FOR FOLLOWING TARGETS IS .01 TO 2000.00 MICRONS



21.0	21.0	13.5	9.7	7.0	5.6	4.6	3.5	2.7	1.8	1.0	.1	.0	.0	.0
25.2	25.2	15.4	10.7	7.0	6.1	4.6	3.4	2.4	1.6	.5	.0	.0	.0	.0
25.8	26.2	15.5	11.2	7.7	5.2	3.0	2.5	1.3	.1	.0	.0	.0	.0	.0
24.2	29.2	14.7	10.4	6.2	4.4	2.2	.5	.0	.0	.0	.0	.0	.0	.0
29.2	29.2	13.6	9.2	4.9	1.4	.0	.0	.0	.0	.0	.0	.0	.0	.0
27.2	27.2	11.6	4.6	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
24.4	24.4	6.4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
16.0	16.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.1	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.1	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

#### D. Dial Pack Simulation Results

For Dial Pack, the dust samples were collected by simply opening a collector and flying through the cloud. The sample was then weighed and a value for average mass concentration obtained by calculating the volume swept out by the samples while it was open and dividing the mass of the sample by the volume. The dust concentration values from sampling which were chosen for comparison are those obtained with an aircraft path through the center of the cloud as closely as possible. Many of the samples were near the cloud edge and the values fluctuated considerably.

Figure 6 shows the CASSANDRA calculation for the Dial Pack cloud at 615 seconds. The aircraft traversal which took place at that time was at 2694 metres altitude. The average mass concentration calculated from the aircraft sample is  $1.6 \times 10^{-8} \text{ g cm}^{-3}$ , shown in parentheses next to the arrow representing the aircraft sampling altitude. The value above the aircraft mass concentration is the average CASSANDRA calculated value at that altitude. The 2.8 below is the CASSANDRA calculated average concentration at 2590 metres altitude. The aircraft path was somewhat more toward the cloud edge than the rest so the value is lower than the CASSANDRA value. Figure 7 shows the CASSANDRA calculation for Dial Pack at 804 seconds. The aircraft traversed the cloud at that time at 2542 metres altitude. The average mass concentration represented by the aircraft sample was  $2.0 \times 10^{-8} \text{ g cm}^{-3}$  as indicated in parentheses at the arrow representing the aircraft position. The average mass concentrations calculated by CASSANDRA were  $2.0 \times 10^{-8} \text{ g cm}^{-3}$  for the altitude of 2590 metres and  $3.0 \times 10^{-8} \text{ g cm}^{-3}$  for 2485 metres. These are shown above and below the aircraft value.

CASSANDRA calculations for Dial Pack cloud at 950 seconds, 1304 seconds, and 1500 seconds are presented as Figures 8, 9, and 10 respectively. Aircraft dust samples were obtained at these times at altitudes of 2390 metres, 2237 metres, and 2085 metres respectively. As before, the average mass concentrations obtained from aircraft samples are shown within parentheses next to the arrow in each figure and CASSANDRA average concentrations are printed for altitudes above and below aircraft results.

In conclusion, the CASSANDRA code has been evaluated by comparison with available field test data. The Dial Pack simulation using CASSANDRA has shown excellent agreement with dust concentrations obtained by aircraft traversing near or at the center of the Dial Pack dust cloud. The agreement constitutes a validation of CASSANDRA for calculating dust concentrations.











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